Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95
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REPLY COMMENTS OF MVDDS 5G COALITION

October 31, 2016

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EXECUTIVE SUMMARY

Commenters in this proceeding broadly agree on a number of fundamental propositions that are critical to the future of the wireless industry in the United States for years to come. First, the industry will need more spectrum in the coming years to meet the demands of expanding wireless broadband use and the promise of next generation (5G) technologies. Second, an efficient wireless marketplace will require a mix of low-, mid-, and high-band spectrum to meet both the coverage and capacity expectations of consumers for 5G. Third, operators need additional allocations of licensed spectrum to deploy for 5G. The Commission itself has recognized the need for more licensed 5G spectrum. More licensed spectrum will provide stakeholders the certainty they need to experiment with new services and make the billions of dollars of new investment necessary to deploy 5G.

In this proceeding the Commission has focused on allocating significant blocks of spectrum in frequency bands from 24 GHz and up. However, allocation of additional spectrum below 24 GHz for mobile use should also enable stakeholders to meet these demands for 5G services. Many commenters agree that the market will be able to deploy efficiently in mid-band spectrum between 6 GHz and 24 GHz. While the millimeter wave bands present various technical hurdles for deployment that will take effort to overcome, fewer challenges exist in mid-band spectrum such as the 12.2-12.7 GHz band (the "12 GHz band"). Over the last few years, various parties have called for the Commission to allocate mid-band spectrum for the deployment of 5G. The 12 GHz band offers a robust existing manufacturing infrastructure. And mid-band spectrum, generally, offers better coverage and requires lower antenna complexity at the user equipment than higher frequency spectrum like the millimeter wave bands.

The Commission now has the opportunity to allocate underutilized mid-band spectrum in the 12 GHz band for use for 5G to the benefit of consumers and continued U.S. leadership in wireless technologies. The MVDDS 5G Coalition has developed a comprehensive framework for a mobile allocation in the 12 GHz band. The rule revisions the MVDDS 5G Coalition has proposed demonstrate that such an allocation is feasible and reasonable. Moreover, the imposition of eight-year performance requirements and specific hybrid performance requirements would further support the rapid deployment of 5G in the 12 GHz band.

Allocation of the 12 GHz band for mobile broadband services would enable the Commission to bring the benefits of 5G to consumers in a timely and balanced manner. The 12 GHz band, in tandem with the other bands already allocated and identified for 5G in this proceeding, would provide the balanced, robust set of spectrum resources needed to realize the promises of next generation technologies.

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REPLY COMMENTS OF THE MVDDS 5G COALITION

I. INTRODUCTION

The Commission has made significant progress in identifying and allocating spectrum for the deployment of 5G. Despite the good work to date, however, commenters agree that the industry will need even more spectrum to realize the promise of next generation wireless applications and technologies. A broad range of low- (<6 GHz), mid- (6-24 GHz), and high-band (>24 GHz) spectrum will best support the coverage and capacity requirements envisioned for 5G. While the millimeter wave bands identified in this proceeding represent an important piece of the spectrum puzzle, allocation of bands in the 6 GHz to 24 GHz range for 5G service would allow for efficient deployment while expanding the total bandwidth available for 5G applications.

The propagation characteristics of higher frequency spectrum such as the millimeter wave bands present challenges that will require time and research to overcome. Deployment on mid-band spectrum such as the 12 GHz band could provide robust 5G network coverage to consumers. Bands such as the 12 GHz band offer propagation characteristics that are very hospitable to the wider deployment of 5G. Moreover, design and manufacture of 5G-capable equipment for the millimeter wave bands present technical challenges that must be addressed,

while these issues are much more manageable in mid-band spectrum, including the 12 GHz band. The MVDDS 5G Coalition has drafted rule revisions to establish a mobile allocation in the 12 GHz band for 5G operations. These revisions are attached as Appendix A to this filing. The adoption of these revisions, including eight-year performance requirements and specific hybrid performance requirements, would create a spectrum band that could bring 5G to market to meet the growing demands of consumers for greater connectivity and speed.

II. ALLOCATION OF ADDITIONAL SPECTRUM FOR 5G IS NECESSARY TO MEET MARKET DEMAND AND ENSURE CONTINUED U.S. LEADERSHIP IN MOBILE BROADBAND SERVICES.

A. The Market Needs More Spectrum to Realize the Full Promise of 5G.

The Commission took critical steps in this proceeding toward making 5G a reality when it allocated 10.85 GHz of spectrum and identified 17.7 GHz of potential additional spectrum for 5G service.[1] While these spectrum allocations are significant,[2] studies from 5G Americas and other proponents of next generation services demonstrate that the wireless industry will need "much more" spectrum to "realize the promise of 5G."[3] Chairman Wheeler's full "spectrum trifecta" of low-, mid-, and high-band spectrum will be needed to support the rapid and

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[1] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Service,* et al., Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (July 14, 2016) ("*Spectrum Frontiers FNPRM*").

[2] *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 (2014) (adopting rules for the 600 MHz Incentive Auction).

[3] Comments of 5G Americas, GN Docket No. 14-177, et al., at 4 (filed Sept. 30, 2016) ("5G Americas Comments"); *see also* Comments of AT&T, GN Docket No. 14-177, et al., at 9 (filed Sept. 30, 2016) ("AT&T Comments") ("mobile service providers will need more spectrum, and lots of it").

successful deployment of 5G.[4] And only "swift" action to identify and support the deployment of more spectrum will enable the U.S. to maintain its global leadership on 5G.[5] Additionally, as AT&T explained, moving quickly "to make this [additional] spectrum available in the near term will best enable potential users, technology developers and innovators to have relative certainty about the spectrum structure" in new frequency bands.[6]

Consideration of additional mid band-spectrum – including the 12 GHz band – will ensure that a range of frequencies becomes available for the deployment of new 5G technologies and applications in the United States. As the Consumer Technology Association ("CTA") said in its comments, "[f]uture generations of mobile service will involve multiple spectrum bands, with the network employing the most appropriate frequencies for the best delivery of a particular service."[7]

B. Allocation of Additional Licensed Spectrum for 5G Will Create the Spectrum Balance Necessary for Successful Deployment.

The Commission has recognized that additional, flexible use licensed spectrum will drive 5G deployment and initiated this proceeding to identify and allocate such spectrum.[8] Truly robust deployment of 5G technologies will depend on leveraging this licensed spectrum with

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[4] Chairman Wheeler has called for a "spectrum trifecta"—that is, "low-band, mid-band, and high-band airwaves that make available unprecedented amounts of spectrum." *See* Remarks of FCC Chairman Tom Wheeler, CTIA Super Mobility Show 2016, Las Vegas, at 3 (Sept. 7, 2016).

[5] Comments of Mobile Future, GN Docket No. 14-177, et al., at 2 (filed Sept. 30, 2016) ("Mobile Future Comments").

[6] AT&T Comments at 4.

[7] Comments of Consumer Technology Association, GN Docket No. 14-177, et al., at 3 (filed Sept. 30, 2016) ("CTA Comments").

[8] *See Spectrum Frontiers FNPRM* ¶ 376 ("In view of these relative proportions, [the Commission] believe[s] it is appropriate to make additional licensed spectrum available for flexible use.").

unlicensed bands to achieve maximum capacity and throughput.[9] The *Spectrum Frontiers Report and Order* makes available 10.85 GHz of millimeter wave spectrum, but only 3.25 GHz of this spectrum, or about 30% of the total, will be licensed on an exclusive basis.[10] The unlicensed allocation includes a 7 GHz block at 64-71 GHz, which when combined with the pre-existing 7 GHz unlicensed allocation at 57-64 GHz, creates a substantial 14 GHz of contiguous unlicensed spectrum. While a powerful statement of support for unlicensed services, these allocations will not necessarily stimulate the facilities-based investment necessary to lead to the deployment of 5G networks that can meet consumer demands for additional capacity.[11] Without more licensed spectrum, the market will be unable to support the predicted 1000x increase in mobile broadband data demand over the next decade.[12] This kind of network will require the certainty of licensed frequencies with the associated larger radius of coverage and the protection

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[9] *See* Comments of Qualcomm Incorporated, GN Docket No. 14-177, et al., at 3 (filed Sept. 30, 2016) ("Qualcomm Comments") ("The fundamental building block for 5G services will be a new air interface that scales across all services and use cases, and supports all types of spectrum access rights, and operates in both unlicensed and licensed spectrum, both exclusive use and shared spectrum."); AT&T Comments at 4; Comments of T-Mobile USA, Inc., GN Docket No. 14-177, et al., at 3 (filed Sept. 30, 2016) ("T-Mobile Comments").

[10] *See* T-Mobile Comments at 2 ("the Report and Order will make available 10.85 gigahertz of millimeter wave spectrum, only 3.25 gigahertz of this spectrum will be licensed on an exclusive basis.").

[11] *See* Ericsson, *5G Radio Access*, at 6 (Apr. 2016), http://bit.ly/2bPpbV4 ("Since its inception, mobile communication has relied on spectrum licensed on a per-operator basis within a geographical area. This will remain the foundation for mobile communication in the 5G era, allowing operators to provide high-quality connectivity in a controlled-interference environment.").

[12] *See* Qualcomm Comments at 3 (citing Qualcomm website, "1000x Data Challenge," *available at* http://bit.ly/2da99Rg (last accessed Oct. 10, 2016)).

from interference.[13] Licensed spectrum has, as noted by T-Mobile, been the "bedrock of the success" in the current wireless marketplace and is liable to form the foundation of 5G services, too.[14]

Licensed spectrum offers stakeholders a predictable and stable environment for experimentation and deployment.[15] As outlined by Qualcomm, licensing also minimizes the potential for co-channel and adjacent-channel interference among users and provides a framework for quickly remediating any interference caused by new operations.[16] Stakeholders cannot reliably ensure the high quality of service necessary to provide a commercial grade 5G network without a healthy supply of both licensed and unlicensed spectrum.[17]

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[13] AT&T Comments at 8 ("Adopting exclusive use licensing will provide innovators with a stable environment in which to experiment with novel 5G services and incentivize investment.").

[14] T-Mobile Comments at 3 ("Making spectrum available for licensed operations will encourage investment and technical innovation by providing carriers with necessary certainty… Spectrum licensed to commercial providers on an exclusive geographic area basis has been the bedrock of the success of today's wireless ecosystem – one of the critical drivers of our nation's economy. The Commission should adopt rules that provide the greatest opportunity to extend that success.").

[15] *See* 4G Americas, *5G Spectrum Recommendations*, at 11 (Aug. 2015), http://bit.ly/1IR6mpb.

[16] Qualcomm Comments at 6 ("Qualcomm also supports licensing these bands on an exclusive basis for flexible usage for it can support a very high quality of service and user experience. Exclusive licensing also enables quick remediation should the new operations cause interference to other users of these bands. Furthermore, exclusive use licensing assigns rights in a way that maximizes the utility of the spectrum, minimizes the potential for interference among co- and adjacent-channel users, and supports the necessary flexibility for licensees to meet the needs of end users.").

[17] *See id.*; 4G Americas, *Meeting the 1000x Challenge: Condensed*, at 4-6 (May 2014), http://bit.ly/2e1tPwb; *see also* Ericsson, *5G Radio Access*, at 6 (Apr., 2016), http://bit.ly/2bPpbV4 ("Since its inception, mobile communication has relied on spectrum licensed on a per-operator basis within a geographical area. This will remain the foundation for mobile communication in the 5G era, allowing operators to provide high-quality connectivity in a controlled-interference environment.").

The 12 GHz band is both licensed and ideal for 5G deployments. Allocation of the 12 GHz band for mobile use would therefore contribute to a better balance of licensed and unlicensed 5G spectrum.

Licensed spectrum bands above 24 GHz also present valuable opportunities for 5G deployment.[18] The propagation characteristics of the A2 (29.10-29.25 GHz) and A3 (31.075-31.225 GHz) bands and the B block (31.00-31.075 GHz and 31.225-31.30 GHz) of the Local Multipoint Distribution Service ("LMDS") spectrum are well suited to 5G deployment.[19] By permitting mobile operations in the A2 and A3 bands and the B block according to flexible, technology-agnostic performance requirements, the Commission can help accelerate 5G deployment, provide certainty to incumbent licensees and manufacturers, reduce equipment costs, encourage experimentation and investment in new applications, and incentivize licensees to optimize their spectrum holdings for 5G services.[20]

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[18] *See, e.g.*, *Spectrum Frontiers FNPRM* ¶ 2 (noting the "inherent opportunities stemming from the physical characteristics of the spectrum" above 24 GHz).

[19] *See, e.g.*, Comments of Nextlink Wireless, LLC, GN Docket No. 14-177, *et al.*, at 3-16 (filed Sept. 30, 2016) ("Nextlink Comments") (noting that the deployment in these bands requires less infrastructure investment and has higher resiliency to environmental conditions). It will be necessary, of course, for the Commission to ensure protection of existing adjacent channel operations as additional spectrum, particularly the LMDS A2 band, is allocated for mobile services.

[20] *See* Nextlink Comments at 18-29.

III. THE WIRELESS INDUSTRY CAN DEPLOY 5G SERVICES EFFICIENTLY IN SPECTRUM BELOW 24 GHZ

A. Higher Frequency Spectrum Presents Technical and Regulatory Challenges for the Deployment of 5G.

The spectrum bands identified by the Commission above 24 GHz for the deployment of 5G represent a valuable component of the full package of spectrum stakeholders will need for robust 5G networks. The bands above 24 GHz have long supported point-to-point communications and will require additional development work to support mobile operations. The technical challenges of these bands, including the propagation characteristics and equipment development issues will require time to overcome.

Many commenters, including Ericsson, Google and Huawei, emphasized that higher frequency bands experience larger path loss, atmosphere loss, rain attenuation, foliage blocking, and outdoor-to-indoor penetration loss.[21] Google noted that the 70/80 GHz bands, for example, have "comparatively poor propagation and atmospheric absorption characteristics" that mean that operations in these spectrum bands "typically require high power and directional gain in order to achieve significant range."[22] Echostar also noted that higher-frequency signals

[21] *See* Samsung, 5G Mobile Communications Presentation at 8 (2016); *see also* Comments of Ericsson, GN Docket No. 14-177 at 25 (filed Jan. 26, 2016) (Higher frequency bands face "greater challenges" in transmissions between outdoor and indoor points); Comments of Google Inc. and Google Fiber Inc., GN Docket No. 14-177, et al., at 7 (filed Sept. 30, 2016) ("Google Comments"); Comments of Huawei Technologies, Inc., GN Docket No. 14-177, et al., at 12-13 (filed Sept. 30, 2016) ("Huawei Comments").

[22] Google Comments at 3.

experience greater attenuation, and clutter plays an important role in system design and coexistence.[23]

Commenters explained that manufacturing equipment (both infrastructure and end user devices and instruments) for use on millimeter wave spectrum faces numerous obstacles, including greater cost and difficult technical/engineering challenges.[24] For example, the millimeter wave bands face issues around lack of semiconductor readiness and power consumption. At high frequencies, making high power, efficient Power Amplifiers ("PAs") that are suitable for mobile devices is challenging.[25] Operation of 5G devices in higher frequencies will additionally require higher power than currently necessary for 4G devices.[26] Time and development will be necessary before manufacturing processes support large scale production and equipment becomes available in sufficient volumes and at low enough prices to support a broad 5G rollout.

Finally, the record indicates that allocation of many millimeter wave bands for mobile use would require extensive coordination to prevent interference with other services. The following are a few examples:

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[23] *See* Comments of Echostar Satellite Operating Corporation and Hughes Network Systems, LLC, GN Docket No. 14-177, et al., at 11 ("Echostar Comments").

[24] *See* Comments of MVDDS 5G Coalition, GN Docket No. 14-177 et al., at 12-16 (filed Sept. 30, 2016) ("MVDDS 5G Coalition Comments"); *see also* GSMA, *Wireless Backhaul Spectrum Policy Recommendations and Analysis*, GSMA.com, at 13 (2014), http://bit.ly/2e4pTKN (explaining that the cost of equipment increases as spectrum frequency increases).

[25] *See* Hayg-Taniel Dabag, Bassel Hanafi, Fatih Golcuk, Amir Agah, James F. Buckwalter, and Peter M. Asbeck, *Analysis and Design of Stacked-FET Millimeter Wave Power Amplifiers*, IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES (Apr. 2013), http://bit.ly/2ecktxi.

[26] *See, e.g., Spectrum Frontiers FNPRM* n.730-732.

- Inmarsat states that the 42-42.5 GHz band presents major "challenges with protecting ubiquitously deployed primary FSS terminals, and the presence of RAS in the adjacent 42.5-43.5 GHz band" such that "it may prove too difficult to authorize this spectrum for [Upper Microwave Flexible Use] services."[27]
- Inmarsat noted that the 47.2-50.2 GHz band would require an "onerous" sharing framework.[28]
- Commenters also argue that mobile use of the 71-76 and 81-86 GHz bands would create the potential for interference to existing fixed links.[29]

Millimeter wave bands will no doubt play an important role in 5G. As these bands and the technology to support mobile uses develop, the Commission also has the opportunity to leverage the propagation characteristics of lower frequency spectrum bands to fully realize the benefits of 5G.

B. Mid-Band Spectrum Offers Advantages for the Deployment of 5G.

Commenters have joined the MVDDS 5G Coalition in advocating for greater consideration of the centimeter wave bands between 6 GHz and 24 GHz, including the 12 GHz band, for 5G applications. The current state of development and propagation characteristics of the centimeter wave bands make them well-suited to rapid deployment of 5G.[30] Ericsson has, for

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[27] *See* Inmarsat Comments at 16; *see also* Comments of The Fixed Wireless Communications Coalition, GN Docket No. 14-177, et al., at 2 (filed Sept. 30, 2016) ("Fixed Wireless Coalition Comments").

[28] Inmarsat Comments at 17.

[29] *See* Fixed Wireless Coalition Comments at 3; Huawei Comments at 10.

[30] Comments of Ericsson, GN Docket No. 14-177, et al., at 6-8 (filed Sept. 30, 2016) ("Ericsson Comments") ("[I]n addition to proceeding with the bands above 24 GHz currently under review in this docket, the Commission should initiate additional proceedings to consider lower frequency bands … [A]pplications envisioned for 5G will require access to appropriate frequency ranges that support a multitude of scenarios including outdoor-to-indoor uses, sufficient bandwidth to support high and ultra-high capacity needs, and sufficient spectrum to support development of an ecosystem."); *see also* Reply Comments of Ericsson, GN Docket No.

example, repeatedly advocated that the Commission focus its attention on deploying 5G on bands below 24 GHz, including bands in the 6-24 GHz range.[31]

Many of the technical challenges described for the millimeter wave bands diminish in lower frequency bands. According to Ericsson, bands in the 6-24 GHz range offer better coverage, improved indoor penetration, and require lower antenna complexity at the user equipment.[32] Moreover, a lower system noise figure is achieved at 6-24 GHz than at higher frequencies.[33] The centimeter wave bands also offer network-design advantages, because the better propagation characteristics allow networks to use fewer base stations to cover a given area.[34]

Another technical challenge of the higher frequency spectrum is achieving optimum PA and LNA performance. The maximum frequency of oscillation, or "Fmax," is one of the key figures of merit for the performance of PAs and LNA, and should be in the order of 3 to 5 times the operating frequency to provide adequate system performance. Thus, Fmax must exceed 100 GHz for the 30 GHz band, and 250 GHz for the 70 GHz band, but only approximately 50 GHz

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14-177 at 12 (filed Feb. 26, 2016) ("There is considerable support in the record for considering bands from 2-30 GHz as well as higher bands.").

[31] *See* Ericsson Comments at 6-7. ("[I]n addition to proceeding with the bands above 24 GHz currently under review in this docket, the Commission should initiate additional proceedings to consider lower frequency bands."); *see also* Reply Comments of Ericsson, GN Docket No. 14-177 at 12 (filed Feb. 26, 2016) ("There is considerable support in the record for considering bands from 2-30 GHz as well as higher bands.").

[32] *See* Comments of Ericsson, GN Docket No. 14-177, at 25 (filed Jan. 26, 2016).

[33] *See* Skyworks Solutions, NR UE system Noise Figure proposal. 3GPP TSG-RAN WG4 Meeting #80bis (Oct. 10-14, 2016).

[34] *See* CTA Comments at 5.

for the 12 GHz band.[35] Increasing transistor Fmax requires different design considerations and potentially different substrate materials,[36] both of which add cost and complexity to the design and impact the manufacturing process.[37]

Due to the lower frequencies and more developed ecosystem, equipment to support 5G deployments in the lower bands is very likely to become available if services are authorized. An equipment manufacturing ecosystem is already in place for DBS devices using 12 GHz frequencies, which has manufactured millions of receivers and amplifiers currently using that spectrum.[38] The substantial manufacturing infrastructure that already exists to support the production of instruments and equipment necessary in the 12 GHz band promises to allow service providers to realize the full benefits of 5G deployment.

Ericsson also highlighted the "particularly attractive" potential ability for bands in the 6-24 GHz range "to balance coverage and capacity" when used in conjunction with the higher spectrum bands.[39] Deploying 5G on lower frequencies, such as the 12 GHz band, would enable the rapid realization of broad 5G coverage in the U.S. Deployment on higher frequency millimeter wave bands would improve the capacity of these networks to realize the full promise

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[35] *See* Skyworks Solutions, mm-wave RFFE technology for NR, 3GPP TSG-RAN WG4 Meeting #80 (Aug. 26, 2016). Fmax represents the oscillation frequency at which the maximum available transistor gain drops to 0 dB. In linear PA design, high Fmax is required to achieve high efficiency.

[36] Hee-Sauk Jhon, Jae-Hong Lee, Jaeho Lee, Byoungchan Oh, Ickhyun Song, Yeonam Yun, Byung-Gook Park, Jong-Duk Lee, and Hyungcheol Shin, *Fmax Improvement by Controlling Extrinsic Parasitics in Circuit-Level MOS Transistor*, IEEE (2009), http://bit.ly/2ehOhur.

[37] *Increasing Fmax for InP/GaInAsSb transistors*, SEMICONDUCTOR-TODAY.COM (March 2014), http://bit.ly/2dDPdv8.

[38] *See* MVDDS 5G Coalition Comments at 17-18.

[39] Ericsson Comments at 7.

of 5G.[40] According to Ericsson, deploying mid-band spectrum for capacity "has advantages over relying on lower frequency bands for capacity coverage and relegating capacity provisioning to limited deployments in densely populated areas – which can result in uneven quality of service, with a patchwork of 'fast' and 'slow' zones that does not live up to the expectations of the Networked Society."[41] Spectrum bands in the 6-24 GHz range could support comprehensive 5G network coverage to broaden the reach of the capacity-building spectrum in the millimeter wave bands, and Ericsson has already begun test-bed trials in the nearby 15 GHz band.[42]

Finally, 5G allocations in the bands between 6 and 24 GHz would also support international harmonization and contribute to U.S. leadership in 5G.[43] Internationally, many providers and regulators are focusing initially on bands below 6 GHz for the deployment of 5G, and then plan to move to bands above 6 GHz.[44] In a report presented at an August 2016 3GPP Meeting, UK operator Orange proposed "a set of frequency bands in the range 6-24 GHz to be

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[40] *See* MVDDS 5G Coalition Comments*; see also* Huawei Comments at 14.

[41] Ericsson Comments at 7.

[42] *See* Ericsson 5G Ran Test–Bed Presentation, IWPC Workshop on 5G Trials and Initiatives towards 2020 at 7 (April 25-27, 2016).

[43] Comments of Ericsson, GN Docket No. 14-177 at 25 (filed Jan. 26, 2016) ("While global harmonization is critical, we are at a stage before global harmonization will occur, and, as a result, U.S. leadership in providing spectrum opportunities for 5G both above and below 30 GHz will inevitably play a role in consideration of global spectrum usage at WRC–19 and beyond.").

[44] *See* China Mobile PowerPoint at 10 (April 2016); *see also* Huawei Presentation, IWPC 5G Trial Workshop at 7 (April 2016) (outlining the "World's First Large Scale Trial" using 100 megahertz of sub-6 GHz spectrum); Samsung, 5G Mobile Communications Presentation at 16 (2016).

considered during the next steps of study," explaining that "it is equally important for 3GPP to address the range 6-24 GHz."[45]

For these reasons, deploying 5G on mid-band frequencies such as the 12 GHz band would enable the rapid realization of broad 5G coverage in the U.S.

IV. THE MVDDS 5G COALITION'S PROPOSED REVISIONS TO THE COMMISSION'S RULES DEMONSTRATE THE FEASIBILITY OF A MOBILE ALLOCATION FOR THE 12 GHZ BAND.

A mobile allocation in the 12 GHz band is both feasible and in line with the rules adopted already in the Spectrum Frontiers proceeding.[46] The MVDDS 5G Coalition has submitted to the Commission proposed revisions to the 12 GHz rules to accommodate mobile use of the band. These revisions, if adopted, would enable the deployment of two-way 5G mobile broadband at 12 GHz and eliminate the co-primary status of Non-Geostationary Satellite Orbit Fixed Satellite Service ("NGSO FSS") in the band, which is not compatible with terrestrial mobile use.

The revised rules integrate the 12 GHz spectrum into the Part 30 rules by adding a mobile allocation to the band and offering an additional swath of spectrum for the deployment of 5G.[47] In the attached revisions, the MVDDS 5G Coalition proposes the following changes:

- Revise Section 2.106 to add a mobile allocation to the 12.2-12.7 GHz band.[48]
- Designate a new service – Lower Microwave Flexible Use Service ("LMFUS") – in the 12 GHz band through the addition of language to Part 30.

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[45] Orange, Spectrum for New Radio, Document for Approval at 3GPP TSG-RAN WG4 meeting #80 (Aug. 22-26, 2016).

[46] *See* Proposed Rules, Appendix A.

[47] *See id.*

[48] The revisions apply to the U.S. Table of Frequency Allocations, only. The International Table would remain the same, but could be modified in a future World Radiocommunication Conference.

- Provide service rules for LMFUS including power limits, frequency tolerance, and maximum bandwidth.

- Delete language in Part 25 and Part 101 referring to an NGSO FSS primary allocation in the band.

- Create coordination requirements and interference protection criteria for LMFUS to ensure coexistence with DBS. This revision included moving language from Part 101 to Part 30.

- Delete most references to MVDDS in Part 101 or, where appropriate, replace these references with references to LMFUS.

These revisions align with the criteria the Commission has already developed for spectrum on which providers will deploy 5G. The proposed revisions would apply to the 12 GHz band nearly all of the same requirements that the Commission has already determined are appropriate for deployment of 5G in the 28, 37, and 39 GHz bands (the Upper Microwave Flexible Use Service, or "UMFUS"). The revisions also address the coordination that would be required with DBS licensees in the band, using an approach modeled on the existing coordination required for MVDDS and DBS licensees.[49] If the Commission seizes this opportunity to adopt these revisions,[50] it would pave the way for rapid deployment of mobile service in the 12 GHz band, fostering the deployment of 5G.

V. EIGHT-YEAR PERFORMANCE REQUIREMENT FOR THE 12 GHZ BAND AND A SPECIFIC HYBRID PERFORMANCE REQUIREMENT WOULD ENCOURAGE TIMELY DEPLOYMENT OF SERVICE TO CONSUMERS.

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[49] *See* 47 C.F.R. § 101.1440.

[50] *See* Petition of MVDDS 5G Coalition for Rulemaking, RM-11768 (filed Apr. 26, 2016), http://bit.ly/2ccx1rf.

Adopting the same eight-year performance requirements for the 12 GHz band that apply to the UMFUS bands would strike the proper balance between ensuring licensees deploy service to the public and providing licensees with the time necessary to prepare a new band for wireless broadband deployment.[51]

The straightforward eight-year performance requirements for UMFUS licensees should apply to 12 GHz LMFUS licensees. Adopting consistent performance requirements for UMFUS and LMFUS licensees would promote timely deployment, encourage investment and promote technology-neutral deployment strategies. UMFUS licensees that provide mobile and point-to-multipoint services must cover 40 percent of the population of the license area and use facilities to provide service.[52] Licensees offering fixed services in the 28 GHz, 39 GHz, or 37 GHz bands must construct and operate at least four links in license areas with a population less than 268,000 and at least one link per 67,000 population in license areas with a population greater than 268,000.[53] As the Commission noted in adopting rules for the above-24 GHz spectrum, an eight-year performance requirement "provide[s] more effective opportunities for licensees to use the spectrum in ways that maximize the flexibility now afforded by our new rules" because "the transition toward providing innovative mobile services is likely to require complex business decisions and changes in plans."[54] Adopting consistent performance requirements for UMFUS and LMFUS licenses will help encourage timely deployment of next-generation broadband

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[51] *See Spectrum Frontiers FNPRM* ¶ 220.

[52] *Id.* ¶ 206.

[53] *Id*. ¶ 208.

[54] *Id*. ¶ 219; *see also* Ericsson Comments at 18 ("Overly prescriptive regulations could choke off experimentation, innovation, and investment, thus limiting use cases and possibilities.").

services while recognizing the challenges of developing and deploying novel communications services to the public.

However, some UMFUS and LMFUS licensees may wish to deploy a mixture of fixed and mobile operations in the band. Failing to adopt discrete performance requirements for these "hybrid" systems may distort investment decisions in favor of either fixed or mobile services, each of which benefit from clear, unequivocal performance metrics that licensees must observe if they wish to retain their licensed spectrum. In its *Further Notice*, the Commission sought comment on how best to evaluate hybrid deployments.[55] Adopting discrete performance requirements drawn from the existing requirements that apply to fixed and mobile uses would offer licensees much more certainty than the complicated case-by-case metric for analyzing hybrid deployments that the Commission originally proposed.

The performance requirements for a hybrid system do not have to be complicated. The performance metrics can rest on a simple linear relationship between the number of links and the percentage of population served. Under this framework, an operator deploying both mobile and fixed links would receive "credit" toward the mobile population-coverage requirement for each fixed link deployed, or "credit" toward the fixed link requirements for certain percentages of mobile population covered.[56] The relationship can be expressed by two formulas.

In both of the following formulas, P represents the market population, y is the number of links built in the hybrid market, and x is the percentage of the population covered by mobile service in the hybrid market (expressed as a decimal). Respecting the minimum of four links per

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[55] *Spectrum Frontiers FNPRM* ¶ 470.

[56] *See* CTIA Comments at 18 (proposing a similar framework as a safe harbor).

market for a fixed-only build, the following formula provides the required number of fixed links for a given amount of mobile population coverage between zero and 40%:

$$y = \max\left(\frac{P}{67000}, 4\right) - 2.5x * \max\left(\frac{P}{67000}, 4\right)$$

The following formula provides the mobile population coverage needed for a given number of fixed links:

$$x = \frac{\max\left(\frac{P}{67000}, 4\right) - y}{2.5 * \max\left(\frac{P}{67000}, 4\right)}$$

These formulas apply for hybrid deployments in which $0 < x < 0.4$ and $0 < y < \max(P/67000,4)$. Two examples help clarify how the formulas function. In a market with a population of 670,000, for example, a fixed deployment would require ten links and a mobile broadband or fixed point-to-multipoint deployment would require coverage of 268,000 POPs (40 percent), according to the current rules. For a hybrid deployment in which mobile service covers only 134,000 POPs (20 percent), however, the first formula above shows that five fixed links will be required to meet the hybrid build out requirement. Alternatively, if the operator has built seven fixed links, the second formula shows that the required mobile coverage to meet the performance requirement is 12 percent of the population, or, in this example, 80,400 POPs.

Applying a simple linear interpolation of these requirements for hybrid deployments will allow the Commission to ensure timely service to the public in a manner that remains agnostic to the licensee's choice of business plan or system architecture.[57]

[57] *See* CTA Comments at 5 ("Build-out or other performance requirements should reflect the strengths and weaknesses of these specific spectrum bands.").

VI. CONCLUSION

The Commission can accelerate the deployment of 5G by authorizing licensees in the 12 GHz band to deploy next-generation wireless services. Commenters in the initial stage of this proceeding agree on the need to act quickly to allocate additional spectrum for licensed 5G operations, especially at frequencies below 24 GHz. The 12 GHz band not only has more robust propagation characteristics compared to the other FNPRM bands currently under consideration for 5G use, but also a well developed capacity for scale production and commercialization. Commenters addressing the issue express a preference for commencing 5G operations at lower frequencies on grounds of technical and economic pragmatism because of these factors. To further accelerate deployment while also ensuring equitable treatment of similar services, the same Part 30 rules that apply to UMFUS operations above 24 GHz can apply to LMFUS operations in 12 GHz band. Finally, adopting a hybrid performance requirement for both the LMFUS and UMFUS would allow for technical and operational flexibility without diminishing the rigor of the performance requirement for either fixed or mobile services. In short, the 12 GHz band offers one of the most promising opportunities for 5G deployment available. The Commission should act now to ensure that the country uses these spectrum assets to their fullest potential.

Respectfully submitted,

MVDDS 5G Coalition

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APPENDIX A

Proposed Rule Revisions to Permit 5G in the 12.2-12.7 GHz Band

The following material shows proposed revisions to the relevant portions of the Federal Communications Commission's Part 2, Part 25, Part 30, and Part 101 rules to allow operators to provide next-generation, 5G mobile broadband services in the 12.2-12.7 GHz band. The material compares relevant excerpts of the Commission's current Title 47 rules against the changes to those rules that the MVDDS 5G Coalition has proposed. Underlined blue text signifies new language. Red text in strikethrough format signifies deleted text. Green text in strikethrough format signifies language that has not changed, but has been moved from its present location. And green underlined text signifies language that has been moved to a new location, but is otherwise unchanged.

PART 2 - FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

§ 2.106 Table of Frequency Allocations [Revised Portions Only].

United States Table		FCC Rule Part(s)
Federal Table	Non-Federal Table	
12.2.-12.75	12.2-12.7 FIXED BROADCASTING-SATELLITE MOBILE except aeronautical mobile 5.488 5.490	Satellite Communications (25) Fixed Microwave (101) Lower Microwave Flexible Use (30)
	12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)

International Table		
Region 1	Region 2	Region 3
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 Mobile except aeronautical mobile 5.485	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A
	12.1-12.2 FIXED SATELLITE (space-to-Earth) 5.484A 5.488 5.485 5.489	
	12.2-12.7 FIXED MOBILE (except aeronautical mobile)	

12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space)	BROADCASTING BROADCASTING-SATELLITE 5.492 5.487A 5.488 5.490	12.2-12.5 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487
5.494 5.495 5.496	12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493

PART 25—SATELLITE COMMUNICATIONS [Revised Sections Only]

§25.115 Applications for earth station authorizations.

(a)(1) *Transmitting earth stations.* Commission authorization must be obtained for authority to operate a transmitting earth station. Applications shall be filed electronically on FCC Form 312, Main Form and Schedule B, and include the information specified in §25.130, except as set forth in paragraph (a)(2) of this section.

(2) Applicants for licenses for transmitting earth stations in the FSS may file on FCC Form 312EZ if all of the following criteria are met:

(i) The application is for a single station that will transmit to an FSS GSO space station, or stations, in the 5925-6425 MHz band, or for single or multiple stations that will transmit to an FSS GSO space station, or stations, in the 14.0-14.5 GHz, 28.35-28.6 GHz, and/or 29.5-30.0 GHz band;

(ii) The earth station(s) will not be installed or operated on ships, aircraft, or other moving vehicles;

(iii) The application meets all relevant criteria in §25.211 or §25.212 or includes information filed pursuant to paragraph (g)(1) of this section indicating that off-axis EIRP density from the proposed earth stations will not exceed relevant levels specified in §25.138(a) or §25.218;

(iv) Operation of the proposed station has been successfully coordinated with terrestrial systems, if the station would transmit in the 5925-6425 MHz band;

(v) The application includes an environmental impact statement pursuant to §1.1311 of this chapter, if required;

(vi) The applicant does not propose to communicate via non-U.S.-licensed space stations not on the Permitted Space Station List; and

(vii) If the proposed station(s) will receive in the 18.3-18.8 GHz and/or 19.7-20.2 GHz bands, the applicant proposes to communicate only via satellites for which coordination has been completed pursuant to Footnote US334 of the U.S. Table of Frequency Allocations with respect to Federal Government systems authorized on a primary basis, under an agreement previously approved by the Commission and the National Telecommunications and Information Administration, and the applicant certifies that it will operate consistently with the agreement.

(3) Unless the Commission orders otherwise, an application filed on FCC Form 312EZ in accordance with paragraph (a)(2) of this section will be deemed granted 35 days after the date of the public notice that the application has been accepted for filing, provided no objection is filed during the 30-day public notice period.

(4) Applications for earth station authorizations must be filed in accordance with the pleading limitations, periods and other applicable provisions of §§1.41 through 1.52 of this chapter, except that such earth station applications must be filed electronically through the International Bureau Filing System (IBFS) in accordance with the applicable provisions of part 1, subpart Y of this chapter;

(b) Receive-only earth stations. Applications to license or register receive only earth stations shall be filed on FCC Form 312, Main Form and Schedule B, and conform to the provisions of §25.131.

(c)(1) *Networks of earth stations operating in the 11.7-12.2 GHz and 14.0-14.5 GHz bands with U.S.-licensed or non-U.S.-licensed space stations for domestic or international services.* Applications to license networks of earth stations operating in any portion of the 11.7-12.2 GHz and 14.0-14.5 GHz bands under blanket operating authority may be filed on FCC Form 312 or Form 312EZ, with a Schedule B for each large (5 meters or larger) hub station antenna and each representative type of small antenna (less than 5 meters) operating within the network.

(i) Applications to license networks of earth stations operating in the 11.7-12.2 GHz and 14.0-14.5 GHz bands under blanket operating authority that meet the requirements of §25.212(c) or §25.218(e) or (f) will be routinely processed.

(ii) Applications to license networks of earth stations operating in the 11.7-12.2 GHz and 14.0-14.5 GHz bands under blanket operating authority that do not meet the requirements of §25.212(c) or §25.218(e) or (f) must comply with the requirements in §25.220 and must be filed on FCC Form 312 with a Schedule B for each large (5 meters or larger) hub station antenna and each representative type of small antenna (less than 5 meters) operating within the network.

(2) *Networks of earth stations operating in the 3700-4200 MHz and 5925-6425 MHz bands.* Applications to license networks of earth stations operating in the 3700-4200 MHz and 5925-6425 MHz bands must be filed electronically on FCC Form 312, Main Form and Schedule B. Applications will be routinely processed provided that frequency coordination has been satisfactorily completed and that the proposed earth stations comply with the applicable provisions in §25.211(d) or §25.212(d). Alternatively, applicants that have satisfactorily completed frequency coordination may be routinely processed if the proposed earth stations comply with the applicable off-axis EIRP density limits in §25.218(c) or (d).

(i) For earth station antennas operating with power levels not consistent with the applicable provisions in §25.211(d) or §25.212(d), or with EIRP density levels not consistent with those specified in §25.218(c) or (d), the applicant must file an initial lead application providing a detailed overview of the complete network. Such lead applications must fully identify the scope and nature of the service to be provided, as well as the complete technical details of each representative type of antenna that will operate within the network. Such lead applications for a single system must identify:

(A) No more than three discrete geostationary satellites to be accessed;

(B) The amount of frequency bandwidth sought, up to a maximum of 20 MHz of spectrum in each direction at each of the satellites (The same 20 MHz of uplink and 20 MHz of downlink spectrum at each satellite would be accessible by all earth stations in the system. The 20 MHz of uplink and 20 MHz of downlink spectrum need not be the same at each satellite location);

(C) The maximum number of earth station sites;

(ii) Following the issuance of a license for the lead application, the licensee shall notify the Commission of the complete technical parameters of each individual earth station site before that site is bought into operation under the lead authorization. Full frequency coordination of each individual site (e.g., for each satellite and the spectrum associated therewith) shall be completed prior to filing Commission notification. The coordination must be conducted in accordance with §25.203. Such notification shall be done by electronic filing and shall be consistent with the technical parameters of Schedule B of FCC Form 312.

(iii) Following successful coordination of such an earth station, if the earth station operator does not file a lead application or a Schedule B within six months after it successfully completes coordination, it will be assumed that such frequency use is no longer desired, unless a second notification has been received within ten days prior to the end of the six month period. Such renewal notifications must be sent to all parties concerned. If the lead application or Schedule B, or renewal notification, is not timely received, the coordination will lapse and the licensee must re-coordinate the relevant earth stations if it still wishes to bring them into operation.

(iv) Operation of each individual site may commence immediately after the public notice is released that identifies the notification sent to the Commission and if the requirements of paragraph (c)(2)(vi) of this section are met. Continuance of operation of each station for the duration of the lead license term shall be dependent upon successful completion of the normal public notice process. If any objections are received to the new station prior to the end of the 30 day comment period of the Public Notice, the licensee shall immediately cease operation of those particular stations until the coordination dispute is resolved and the licensee informs the Commission of the resolution. If the requirements of paragraph (c)(2)(vi) of this section are not met, operation may not commence until the Commission issues the public notice acting on the terminal authorization.

(v) Each licensee shall annually provide the Commission an updated list of all operational earth stations in its system. The annual list shall also include a list of all earth stations deactivated during the year and identification of the satellites providing service to the network as of the date of the report.

(vi) *Conditional authorization.* (A) An applicant for a new radio station or modification of an existing station authorized under paragraph (c)(2)(i) of this section in the 3700-4200; or 5925-6425 MHz bands may operate the proposed station during the pendency of its application after the release of the public notice accepting the notification for filing that complies with paragraph (c)(2)(ii) of this section. The applicant, however, must first certify that the following conditions are satisfied:

(*1*) The frequency coordination procedures of §25.203 have been successfully completed;

(*2*) The antenna structure has been previously studied by the Federal Aviation Administration and determined to pose no hazard to aviation safety as required by subpart B of part 17 of this chapter; or the antenna or tower structure does not exceed 6.1 meters above ground level or above an existing man-made structure (other than an antenna structure), if the antenna or tower has not been previously studied by the Federal Aviation Administration and cleared by the FCC;

(*3*) The grant of the application(s) does not require a waiver of the Commission's rules (with the exception of a request for waiver pertaining to fees);

(*4*) The applicant has determined that the facility(ies) will not significantly affect the environment as defined in §1.1307 of this chapter after complying with any applicable environmental notification procedures specified in §17.4(c) of this chapter.

(*5*) The station site does not lie within 56.3 kilometers of any international border or within a radio “Quiet Zone” identified in §1.924 of this chapter; and

(*6*) The filed application is consistent with the proposal that was coordinated pursuant to §25.251.

(B) Conditional authority ceases immediately if the Schedule B is returned by the Commission because it is not accepted for filing.

(C) A conditional authorization pursuant to paragraphs (c)(2)(vi)(A) and (c)(2)(vi)(B) of this section is evidenced by retaining a copy of the Schedule B notification with the station records. Conditional authorization does not prejudice any action the Commission may take on the subject application(s) or the Schedule B notifications.

(D) Conditional authority is accepted with the express understanding that such authority may be modified or cancelled by the Commission at any time without hearing if, in the Commission's discretion, the need for such action arises. An applicant operating pursuant to this conditional authority assumes all risks associated with such operation, the termination or modification of the conditional authority, or the subsequent dismissal or denial of its application(s).

(E) The copy of the Schedule B notification form must be posted at each station operating pursuant to this section.

(vii) *Period of construction.* Construction of each earth station must be completed and the station must be brought into regular operation within twelve months from the date that action is taken to authorize that station to operate under the lead authorization, except as may be otherwise determined by the Commission for any particular application.

(3) Networks of earth stations operating in the 18.3-18.8 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, and 29.25-30 GHz bands with U.S.-licensed or non-U.S.-licensed satellites for domestic or international services.

(i) Applications to license networks of earth stations that will transmit digitally modulated signals to GSO space stations in the 28.35-28.6 GHz and/or 29.25-30.0 GHz bands under blanket operating authority must be filed on FCC Form 312, or Form 312EZ if available, with a Schedule B for each large (5 meters or larger) hub station antenna and each representative type of small antenna (less than 5 meters) operating within the network and may be routinely processed if the criteria in paragraphs (c)(3)(i)(A) and (B) of this section are met:

(A) The applicant certifies pursuant to §25.132(a)(1) that the off-axis gain of transmitting antennas in the network will not exceed the relevant levels specified in §25.209(a) and (b) and the power spectral density of any digitally modulated carrier into any transmitting earth station antenna in the proposed network will not exceed 3.5 dBW/MHz as specified in §25.212(e).

(B) The application includes information filed pursuant to paragraph (g)(1) of this section indicating that off-axis EIRP density from the proposed earth stations will not exceed relevant routine levels specified in §25.138(a).

(ii) Applications to license networks of earth stations operating in the 28.35-28.6 GHz and/or 29.25-30.0 GHz bands under blanket operating authority that do not meet the requirements of §25.212(e) or §25.138(a) must comply with the requirements in §25.220 and must be filed on FCC Form 312 with a Schedule B for each large (5 meters or larger) hub station antenna and each representative type of small antenna (less than 5 meters) operating within the network.

(d) Mobile-Satellite Service user transceivers need not be individually licensed. Service vendors may file blanket applications for such transceivers using FCC Form 312, Main Form and Schedule B, specifying the number of units to be covered by the blanket license. A blanket license application for 1.5/1.6 GHz MSS user transceivers must include an explanation of how the applicant will comply with the priority and preemptive access requirements in §25.287.

(e) License applications for earth station operation in any portion of the 18.3-20.2 GHz and 28.35-30.0 GHz bands not filed on FCC Form 312EZ pursuant to paragraph (a)(2) of this section must be filed on FCC Form 312, Main Form and Schedule B, and must include any information required by paragraph (g) or (j) of this section or by §25.130. An applicant may request authority for operation of GSO FSS earth stations in the conventional Ka-band, or for operation of NGSO FSS earth stations in the 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 (Earth-to-space) bands, without specifying the location of user terminals but must specify the geographic area(s) in which they will operate and the location of hub and/or gateway stations.

(f) User transceivers in the non-geostationary satellite orbit Fixed-Satellite Service in the 11.7-12.2 GHz~~, 12.2-12.7 GHz~~ and 14.0-14.5 GHz bands need not be individually licensed. Applications for blanket authority to operate transceiver units may be filed using FCC Form 312, Main Form and Schedule B. Each application for a blanket license under this section shall include the information described in §25.146. Any earth stations that are not user transceivers, and which transmit in the non-geostationary satellite orbit Fixed-Satellite Service in the 10.7-11.7 GHz, 12.75-13.15 GHz, 13.2125-13.25 GHz, and 13.75-14.0 GHz bands must be individually licensed, pursuant to paragraph (a) of this section.

(g) Applications for earth stations that will transmit to GSO space stations in any portion of the 5850-6725 MHz, 13.75-14.5 GHz, 24.75-25.25 GHz, 28.35-28.6 GHz, or 29.25-30.0 GHz bands must include, in addition to the particulars of operation identified on FCC Form 312 and associated Schedule B, the information specified in either paragraph (g)(1) or (g)(2) of this section for each earth station antenna type.

(1) Specification of off-axis EIRP density calculated from measurements made consistent with the requirements in §25.132(b)(1), in accordance with the following requirements. For purposes of this rule, the “off-axis angle” is the angle in degrees from a line between an earth station antenna and the target satellite.

(i) A plot of maximum co-polarized EIRP density in the plane tangent to the GSO arc at off-axis angles from minus 180° to plus 180°;

(ii) A plot of maximum co-polarized EIRP density in the plane tangent to the GSO arc at off-axis angles from minus 10° to plus 10°;

(iii) A plot of maximum co-polarized EIRP density in the plane perpendicular to the GSO arc at off-axis angles from 0° to plus 30°;

(iv) A plot of maximum cross-polarized EIRP density in the plane tangent to the GSO arc at off-axis angles from minus 7° to plus 7°;

(v) A plot of maximum cross-polarized EIRP density in the plane perpendicular to the GSO arc at off-axis angles from minus 7° to plus 7°;

(vi) For antennas for which gain measurements are made pursuant to §25.132(b)(1)(iv), the EIRP density plots specified in paragraphs (g)(1)(i) through (v) of this section must be provided over the specified angular ranges in two orthogonal planes, one of which is tangent to the GSO arc and with the antenna operating at its maximum skew angle, which the applicant must specify.

(vii) The relevant off-axis EIRP density envelopes in §25.138, §25.218, §25.221, §25.222, §25.223, §25.226, or §25.227 must be superimposed on plots submitted pursuant to paragraphs (g)(1)(i) through (vi) of this section.

(viii) The showing must include a supplemental table for each off-axis angular range in which the relevant EIRP density envelope will be exceeded, specifying angular coordinates in degrees off-axis and corresponding calculated off-axis EIRP density at 0.2° increments over the angular range in which the routine envelope will be exceeded and one degree on each side of that range.

(2) An applicant that certifies pursuant to §25.132(a)(1) that a proposed antenna's measured gain pattern conforms to relevant standards in §25.209(a) and (b) and that input power density to the antenna will not exceed the relevant limit in §25.211 or §25.212 need not provide a showing pursuant to paragraph (g)(1) of this section for operation with that antenna.

(h) [Reserved]

(i) An earth station applicant filing an application for a blanket-licensed earth station network made up of FSS earth stations and planning to use a contention protocol must include in its application a certification that its contention protocol usage will be reasonable.

(j) An application for a new fixed earth station or modification involving alteration of the overall height of one or more existing earth station antenna structures must include the FCC Antenna Structure Registration Number(s) for the antenna structure(s), if assigned. If no such number has been assigned, the application must state whether prior FAA notification is required by part 17 of this chapter and, if so, whether the applicant or owner of the structure has notified the FAA of the proposed construction or alteration and applied for an Antenna Structure Registration Number in accordance with part 17 of this chapter. Applicants who maintain that prior FAA notification is not required for construction or alteration of a structure with overall height more than 6.1 meters above ground level must explain in the application why such prior notification is not required.

(k)(1) Applicants for FSS earth stations that qualify for routine processing in the conventional or extended C-bands, the conventional or extended Ku-bands, the conventional Ka-band, or the 24.75-25.25 GHz band, including ESV applications filed pursuant to §25.222(a)(1) or (a)(3), VMES applications filed pursuant to §25.226(a)(1) or (a)(3), and ESAA applications filed pursuant to §25.227(a)(1) or (a)(3), may designate the Permitted Space Station List as a point of communication. Once such an application is granted, the earth station operator may communicate with any space station on the Permitted Space Station List, provided that the operation is consistent with the technical parameters and conditions in the earth station license and any limitations placed on the space station authorization or noted in the Permitted Space Station List.

(2) Notwithstanding paragraph (k)(1) of this section, the operator of an earth station that qualifies for routine processing in the conventional Ka-band may not communicate with a space station on the

Permitted Space Station List in the 18.3-18.8 GHz or 19.7-20.2 GHz band until the space station operator has completed coordination under Footnote US334 to §2.106 of this chapter.

[62 FR 5928, Feb. 10, 1997]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §25.115, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov.*

~~**§25.139 NGSO FSS coordination and information sharing between MVDDS licensees in the 12.2 GHz to 12.7 GHz band.**~~

~~(a) NGSO FSS licensees shall maintain a subscriber database in a format that can be readily shared with MVDDS licensees for the purpose of determining compliance with the MVDDS transmitting antenna spacing requirement relating to qualifying existing NGSO FSS subscriber receivers set forth in §101.129 of this chapter. This information shall not be used for purposes other than set forth in §101.129 of this chapter. Only sufficient information to determine compliance with §101.129 of this chapter is required.~~

~~(b) Within ten business days of receiving notification of the location of a proposed MVDDS transmitting antenna, the NGSO FSS licensee shall provide sufficient information from the database to enable the MVDDS licensee to determine whether the proposed MVDDS transmitting site meets the minimum spacing requirement.~~

~~(c) If the location of the proposed MVDDS transmitting antenna site does not meet the separation requirements of §101.129 of this chapter, then the NGSO FSS licensee shall also indicate to the MVDDS licensee within the same ten day period specified in paragraph (b) of this section whether the proposed MVDDS transmitting site is acceptable at the proposed location.~~

~~(d) Nothing in this section shall preclude NGSO FSS and MVDDS licensees from entering into an agreement to accept MVDDS transmitting antenna locations that are shorter-spaced from existing NGSO FSS subscriber receivers than the distance set forth in §101.129 of this chapter.~~

~~[67 FR 43037, June 26, 2002, as amended at 68 FR 43945, July 25, 2003]~~

§25.146 Licensing and operating rules for the NGSO FSS in the 10.7-14.5 GHz bands.

(a) A comprehensive technical showing shall be submitted for the proposed non-geostationary satellite orbit Fixed-Satellite Service (NGSO FSS) system in the 10.7-14.5 GHz bands. The technical information shall demonstrate that the proposed NGSO FSS system would not exceed the validation equivalent power flux-density (EPFD) limits as specified in §25.208 (g), (k), and (l) for $EPFD_{down}$, and $EPFD_{up}$. If the technical demonstration exceeds the validation EPFD limits at any test points within the U.S. for domestic service and at any points outside of the U.S. for international service or at any points in the geostationary satellite orbit, as appropriate, the application would be unacceptable for filing and will be returned to the applicant with a brief statement identifying the non-compliance technical demonstration. The technical showing consists of the following:

(1) *Single-entry validation equivalent power flux-density, in the space-to-Earth direction, ($EPFD_{down}$) limits.* (i) Provide a set of power flux-density (PFD) masks, on the surface of the Earth, for each space station in the NGSO FSS system. The PFD masks shall be generated in accordance with the specification stipulated in the most recent version of ITU-R S.1503-2 (incorporated by reference, *see* §25.108). In particular, the PFD masks must encompass the power flux-density radiated by the space station regardless of the satellite transmitter power resource allocation and traffic/beam switching strategy that are used at different periods of a NGSO FSS system's life. The PFD masks shall

also be in an electronic form that can be accessed by the computer program specified in paragraph (a)(1)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the power flux-density masks.

(iii) If a computer program that has been approved by the ITU for determining compliance with the single-entry $EPFD_{down}$ validation limits is not yet available, the applicant shall provide a computer program for the single-entry $EPFD_{down}$ validation computation, including both the source code and the executable file. This computer program shall be developed in accordance with the specification stipulated in the most recent version of Recommendation ITU-R S.1503. If the applicant uses the ITU approved software, the applicant shall indicate the program name and the version used.

(iv) Identify and describe in detail the necessary input parameters for the execution of the computer program identified in paragraph (a)(1)(iii) of this section.

(v) Provide the result, the cumulative probability distribution function of EPFD, of the execution of the computer program described in paragraph (a)(1)(iii) of this section by using only the input parameters contained in paragraphs (a)(1)(i) and (a)(1)(iv) of this section.

(2) *Single-entry additional operational equivalent power flux-density, in the Earth-to-space direction, (additional operational* $EPFD_{up}$*) limits.* (i) Provide a set of NGSO FSS earth station maximum equivalent isotropically radiated power (EIRP) masks as a function of the off-axis angle generated by an NGSO FSS earth station. The maximum EIRP mask shall be generated in accordance with the specification stipulated in the most recent version of ITU-R Recommendation S.1503. In particular, the results of calculations encompass what would be radiated regardless of the earth station transmitter power resource allocation and traffic/beam switching strategy are used at different periods of an NGSO FSS system's life. The EIRP masks shall be in an electronic form that can be accessed by the computer program specified in paragraph (a)(2)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the maximum earth station e.i.r.p. mask.

(iii) If a computer program that has been approved by the ITU for determining compliance with the single-entry $EPFD_{up}$ validation limits is not yet available, the applicant shall provide a computer program for the single-entry $EPFD_{up}$validation computation, including both the source code and the executable file. This computer program shall be developed in accordance with the specification stipulated in the most recent version of Recommendation ITU-R S.1503. If the applicant uses the ITU approved software, the applicant shall indicate the program name and the version used.

(iv) Identify and describe in detail the necessary input parameters for the execution of the computer program identified in paragraph (a)(2)(iii) of this section.

(v) Provide the result of the execution of the computer program described in paragraph (a)(2)(iii) of this section by using only the input parameters contained in paragraphs (a)(2)(i) and (a)(2)(iv) of this section.

(b) Ninety days prior to the initiation of service to the public, the NGSO FSS system licensee shall submit a comprehensive technical showing for the non-geostationary satellite orbit Fixed-Satellite Service (NGSO FSS) system in the 10.7-14.5 GHz bands. The technical information shall demonstrate that the NGSO FSS system is expected not to operate in excess of the additional operational $EPFD_{down}$ limits and the operational $EPFD_{down}$ limits as specified in §25.208(i) and (j), and notes 2 and 3 to Table 1L in §25.208(*l*). If the technical demonstration exceeds the additional operational $EPFD_{down}$ limits or the operational $EPFD_{down}$ limits at any test points within the United States for domestic service and at

any test points outside of the United States for international service, the NGSO FSS system licensee shall not initiate service to the public until the deficiency has been rectified by reducing satellite transmission power or other adjustments. This must be substantiated by subsequent technical showings. The technical showings consist of the following:

(1) *Single-entry additional operational equivalent power flux-density, in the space-to-Earth direction, (additional operational $EPFD_{down}$) limits.* (i) Provide a set of anticipated operational power flux density (PFD) masks, on the surface of the Earth, for each space station in the NGSO FSS system. The anticipated operational PFD masks could be generated by using the method specified in the most recent version of ITU-R Recommendation S.1503. In particular, the anticipated operational PFD mask shall take into account the expected maximum traffic loading distributions and geographic specific scheduling of the actual measured space station antenna patterns (see §25.210(k)). The anticipated operational PFD masks shall also be in an electronic form that can be accessed by the computer program contained in paragraph (b)(1)(iii) of this section.

(ii) Identify and describe in detail the assumptions and conditions used in generating the anticipated operational power flux-density masks.

(iii) Provide a computer program for the single-entry additional operational $EPFD_{down}$ verification computation, including both the source code and the executable file. This computer program could be developed by using the method specified in the most recent version of ITU-R Recommendation S.1503.

(iv) Identify and describe in detail the necessary input parameters for the execution of the additional operational $EPFD_{down}$ verification computer program identified in paragraph (b)(1)(iii) of this section.

(v) Provide the result, the cumulative probability distribution function of EPFD, of the execution of the verification computer program described in paragraph (b)(1)(iii) of this section by using only the input parameters contained in paragraphs (b)(1)(i) and (iv) of this section for each of the submitted test points provided by the Commission. These test points are based on information from U.S.-licensed geostationary satellite orbit Fixed-Satellite Service and Broadcasting-Satellite Service operators in the 10.7-14.5 GHz bands. Each U.S.-licensed geostationary satellite orbit Fixed-Satellite Service and Broadcasting-Satellite Service operator in the 10.7-14.5 GHz bands may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by non-geostationary satellite orbit Fixed-Satellite Service licensees in the 10.7-14.5 GHz bands during the upcoming year.

(2) Operational equivalent power flux-density, space-to-Earth direction, (operational $EPFD_{down}$) limits. Using the information contained in (b)(1) of this section plus the measured space station antenna patterns, provide the result of the execution of the computer simulation for the anticipated in-line operational $EPFD_{down}$ levels for each of the submitted test points provided by the Commission. Submitted test points are based on inputs from U.S.-licensed geostationary satellite orbit Fixed-Satellite Service and Broadcasting-Satellite Service operators in the 10.7- 14.5 GHz bands. Each U.S.-licensed geostationary satellite orbit Fixed-Satellite Service and Broadcasting-Satellite Service operator in the 10.7-14.5 GHz bands may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by non-geostationary satellite orbit Fixed-Satellite Service licensees in the 10.7-14.5 GHz bands during the upcoming year.

(c) [Reserved]

(d) The Commission may request at any time additional information from the NGSO FSS system applicant or licensee concerning the EPFD levels and the related technical showings.

(e) An NGSO FSS system licensee operating a system in compliance with the limits specified in §25.208(g), (i), (j), (k), (l), and (m) shall be considered as having fulfilled its obligations under ITU Radio Regulations Article 22.2 with respect to any GSO network. However, such NGSO FSS system shall not claim protection from GSO FSS and BSS networks operating in accordance with part 25 of this chapter and the ITU Radio Regulations.

(f) Coordination will be required between NGSO FSS systems and GSO FSS earth stations in the frequency band 10.7-~~12.75~~12.2 GHz when all of the following threshold conditions are met:

(1) Bandwidth overlap; and

(2) The satellite network using the GSO has specific receive earth stations which meet all of the following conditions: earth station antenna maximum isotropic gain greater than or equal to 64 dBi; G/T of 44 dB/K or higher; and emission bandwidth of 250 MHz; and the $EPFD_{down}$ radiated by the satellite system using the NGSO into the GSO specific receive earth station, either within the U.S. for domestic service or any points outside the U.S. for international service, as calculated using the ITU software for examining compliance with EPFD limits set forth in Article 22 of the ITU Radio Regulations exceeds −174.5 dB(W/(m2/40kHz)) for any percentage of time for NGSO systems with all satellites only operating at or below 2500 km altitude, or −202 dB(W/(m2/40kHz)) for any percentage of time for NGSO systems with any satellites operating above 2500 km altitude.

(3) If there is no ITU software for examining compliance with EPFD limits set forth in Article 22 of the ITU Radio Regulations, then the $EPFD_{down}$ coordination trigger is suspended and the requirement for coordination will be based on bandwidth overlap and the satellite network using the GSO has specific receive earth stations which meet all of the following conditions: earth station antenna maximum isotropic gain greater than or equal to 64 dBi; G/T of 44 dB/K or higher; and emission bandwidth of 250 MHz.

(g) ~~*Operational power flux-density, space-to-Earth direction, limits.* Ninety days prior to the initiation of service to the public, the NGSO FSS system licensee shall submit a technical showing for the NGSO FSS system in the band 12.2-12.7 GHz. The technical information shall demonstrate that the NGSO FSS system is capable of meeting the limits as specified in §25.208(o). Licensees may not provide service to the public if they fail to demonstrate compliance with the PFD limits.~~[Reserved]

(h) System License. Applicants authorized to construct and launch a system of technically identical non-geostationary satellite orbit Fixed-Satellite Service satellites will be awarded a single "blanket" license covering a specified number of space stations to operate in a specified number of orbital planes.

(i) In addition to providing the information specified in §25.114, each NGSO FSS applicant shall provide the following:

(1) A demonstration that the proposed system is capable of providing fixed-satellite services on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands, U.S.; and

(2) A demonstration that the proposed system is capable of providing Fixed-Satellite Services to all locations as far north as 70° North Latitude and as far south as 55° South Latitude for at least 75 percent of every 24-hour period; and

(3) Sufficient information on the NGSO FSS system characteristics to properly model the system in computer sharing simulations, including, at a minimum, NGSO hand-over and satellite switching strategies, NGSO satellite antenna gain patterns, and NGSO earth station antenna gain patterns. In particular, each NGSO FSS applicant must explain the switching protocols it uses to avoid transmitting while passing through the geostationary satellite orbit arc, or provide an explanation as to how the PFD

limits in §25.208 are met without using geostationary satellite orbit arc avoidance. In addition, each NGSO FSS applicant must provide the orbital parameters contained in Section A.4 of Annex 2A to Appendix 4 of the ITU Radio Regulations (2008). Further, each NGSO FSS applicant must provide a sufficient technical showing to demonstrate that the proposed non-geostationary satellite orbit system meets the PFD limits contained in §25.208, as applicable, and

(4) [Reserved]

(j)-(l) [Reserved]

[66 FR 10619, Feb. 16, 2001, as amended at 67 FR 53510, Aug. 16, 2002; 68 FR 16447, Apr. 4, 2003; 68 FR 43946, July 25, 2003; 68 FR 51505, Aug. 27, 2003; 69 FR 31302, June 3, 2004; 70 FR 59277, Oct. 12, 2005; 78 FR 8423, Feb. 6, 2013; 79 FR 8320, Feb. 12, 2014; 81 FR 55333, Aug. 18, 2016]

§25.208 Power flux density limits.

(a) In the band 3650-4200 MHz, the power flux density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the following values:

−152 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−152 + (δ−5)/2 dB(W/m^2) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

−142 dB(W/m^2) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane

These limits relate to the power flux density which would be obtained under assumed free-space propagation conditions.

(b) In the bands 10.95-11.2 and 11.45-11.7 GHz for GSO FSS space stations and 10.7-11.7 GHz for NGSO FSS space stations, the power flux-density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the lower of the following values:

(1) −150 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane; −150 + (δ−5)/2 dB(W/m^2) in any 4 kHz band for angles of arrival (δ) (in degrees) between 5 and 25 degrees above the horizontal plane; and −140 dB(W/m^2) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane; or

(2) −126 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane; −126 + (δ−5)/2 dB(W/m^2) in any 1 MHz band for angles of arrival (δ) (in degrees) between 5 and 25 degrees above the horizontal plane; and −116 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

NOTE TO PARAGRAPH (B): These limits relate to the power flux density, which would be obtained under assumed free-space propagation conditions.

(c) In the 17.7-17.8 GHz, 18.3-18.8 GHz, 19.3-19.7 GHz, 22.55-23.00 GHz, 23.00-23.55 GHz, and 24.45-24.75 GHz frequency bands, the power flux density at the Earth's surface produced by emissions from a space station for all conditions for all methods of modulation shall not exceed the following values:

(1) −115 dB (W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane.

(2) −115 + 0.5 (δ-5) dB (W/m²) in any 1 MHz band for angles of arrival d (in degrees) between 5 and 25 degrees above the horizontal plane.

(3) −105 dB (W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

(d) In addition to the limits specified in paragraph (c) of this section, the power flux-density across the 200 MHz band 18.6-18.8 GHz produced at the Earth's surface by emissions from a space station under assumed free-space propagation conditions shall not exceed −95 dB (W/m²) for all angles of arrival. This limit may be exceeded by up to 3 dB for no more than 5% of the time.

(e) In the 18.8-19.3 GHz frequency band, the power flux-density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the following values:

−115−X dB(W/m^2 ÷ MHz)	for 0° ≤δ <5°
−115−X + ((10 + X)/20)(δ−5)dB(W/m^2 ÷ MHz)	for 5° ≤δ <25°
−105 dB(W/m^2 ÷ MHz)	for 25° ≤δ <90°

Where:

δ: is the angle of arrival above the horizontal plane; and

X is defined as a function of the number of satellites in the non-GSO FSS constellation, n, as follows:

for n ≤50	X = 0 (dB)
for 50 <n ≤288	X = (5/119) (n − 50) (dB)
for n >288	X = (1/69) (n + 402) (dB)

(f) [Reserved]

(g) In the 10.7-11.7 GHz and 11.7-12.2 GHz bands, the single-entry equivalent power-flux density in the space-to-Earth direction ($EPFD_{down}$), at any point on the Earth's surface, produced by emissions from all co-frequency space stations of a single non-geostationary-satellite orbit (NGSO) system operating in the Fixed-Satellite Service (FSS) shall not exceed the following limits for the given percentages of time. Tables 1G and 2G follow:

TABLE 1G—SINGLE-ENTRY $EPFD_{down}$ LIMITS FOR PROTECTION OF 0.6, 1.2, 3 AND 10 METER GSO FSS EARTH STATION ANTENNAS[1] [2]

Frequency band (GHz) for International Allocations	Single-entry $EPFD_{down}$dB(W/m^2)	Percentage of time during which $EPFD_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−175.4 −174 −170.8 −165.3 −160.4 −160 −160	0 90 99 99.73 99.991 99.997 100	40	60 cm, Recommendation ITU-R S.1428.

10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−181.9 −178.4 −173.4 −173 −164 −161.6 −161.4 −160.8 −160.5 −160 −160	0 99.5 99.74 99.857 99.954 99.984 99.991 99.997 99.997 99.9993 100	40	1.2 m, Recommendation ITU-R S.1428.
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−190.45 −189.45 −187.45 −182.4 −182 −168 −164 −162 −160 −160	0 90 99.5 99.7 99.855 99.971 99.988 99.995 99.999 100	40	3 m, Recommendation ITU-R S.1428.
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−195.45 −195.45 −190 −190 −172.5 −160 −160	0 99 99.65 99.71 99.99 99.998 100	40	10 m, Recommendation ITU-R S.1428.

[1]In addition to the limits shown in Table 1G, the limits shown in Table 2G shall apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table 1G.

[2]For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the EPFD levels and logarithmic for the time percentages, with straight lines joining the data points.

[3]The earth station antenna reference radiation patterns are to be used only for the calculation of interference from NGSO FSS systems into GSO FSS systems.

TABLE 2G—SINGLE-ENTRY $EPFD_{down}$ LIMITS RADIATED BY NON-GSO FSS SYSTEMS AT CERTAIN LATITUDES

100% of the time $EPFD_{down}$ dB(W/(m²/40 kHz))	**Latitude (North or South in degrees)**
-160	0 <| Latitude | ≤57.5.
-160 + 3.4 (57.5 − | Latitude |)/4	57.5 <| Latitude | ≤63.75
-165.3	63.75 ≤| Latitude |

NOTE TO PARAGRAPH (G): These limits relate to the equivalent power flux density, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(h) In the 10.7-11.7 GHz and 11.7-12.2 GHz bands, the aggregate equivalent power-flux density in the space-to-Earth direction ($EPFD_{down}$), at any point on the Earth's surface, produced by emissions from all co-frequency space stations of all non-geostationary-satellite orbit systems operating in the Fixed-

Satellite Service (FSS) shall not exceed the following limits for the given percentages of time. Tables 1H and 2H follow:

TABLE 1H—AGGREGATE $EPFD_{down}$ LIMITS FOR PROTECTION OF 0.6, 1.2, 3 AND 10 METER GSO FSS EARTH STATION ANTENNAS[1]

Frequency band (GHz) for International Allocations	Aggregate $EPFD_{down}$ dB(W/m^2)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[2]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−170 −168.6 −165.3 −160.4 −160 −160	0 90 99 99.97 99.99 100	40	60 cm, Recommendation ITU-R S.1428.
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−176.5 −173 −164 −161.6 −164.4 −160.8 −160.5 −160 −160	0 99.5 99.84 99.945 99.97 99.99 99.99 99.9975 100	40	1.2 m, Recommendation ITU-R S.1428.
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−185 −184 −182 −168 −164 −162 −160 −160	0 90 99.5 99.9 99.96 99.982 99.997 100	40	3 m, Recommendation ITU-R S.1428.
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−190 −190 −166 −160 −160	0 99 99.99 99.998 100	40	10 m, Recommendation ITU-R S.1428.

[1]In addition to the limits shown in Table 1H, the aggregate $EPFD_{down}$ limits shown in Table 2H shall apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table 1H.

[2]The earth station antenna reference patterns are to be used only for the calculation of interference from NGSO FSS systems into GSO FSS systems.

TABLE 2H—SINGLE-ENTRY $EPFD_{down}$ LIMITS RADIATED BY NON-GSO FSS SYSTEMS AT CERTAIN LATITUDES

100% of the time $EPFD_{down}$ dB($W/(m^2/40$ kHz))	Latitude (North or South in degrees)
-160	0 <| Latitude | ≤57.5
-160 + 3.4 (57.5 − | Latitude |)/4	57.5 <| Latitude | ≤63.75
-165.3	63.75 ≤| Latitude |

NOTE TO PARAGRAPH (H): These limits relate to the equivalent power flux density, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(i) In the 10.7-11.7 GHz and 11.7-12.2 GHz bands, the additional operational equivalent power-flux density, in the space-to-Earth direction, (additional operational $EPFD_{down}$) at any point on the Earth's surface, produced by actual operational emissions from all co-frequency space stations of a non-geostationary-satellite orbit (NGSO) system operating in the Fixed-Satellite Service (FSS) shall not exceed the following operational limits for the given percentages of time:

ADDITIONAL OPERATIONAL LIMITS ON THE $EPFD_{down}$ RADIATED BY NON-GSO FSS SYSTEMS INTO 3 M AND 10 M GSO FSS EARTH STATION ANTENNAS

$EPFD_{down}$ dB(W/(m^2/40 kHz))	Percentage of time during which $EPFD_{down}$ may not be exceeded	Receive GSO earth station antenna diameter (m)
−182	99.9	
−179	99.94	
−176	99.97	
−171	99.98	
−168	99.984	3
−165	99.993	
−163	99.999	
−161.25	99.99975	
−161.25	100	
−185	99.97	
−183	99.98	
−179	99.99	
−175	99.996	
−171	99.998	10
−168	99.999	
−166	99.9998	
−166	100	

NOTE TO PARAGRAPH (I): These limits relate to the equivalent power flux density, which is obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(j) In the 10.7-11.7 GHz and 11.7-12.2 GHz bands, the operational equivalent power-flux density, in the space-to-Earth direction, (operational $EPFD_{down}$) at any point on the Earth's surface, produced by actual operational emissions from the in-line co-frequency space station of a non-geostationary-satellite orbit (NGSO) system operating in the Fixed-Satellite Service (FSS) shall not exceed the following operational limits for 100% of the time:

OPERATIONAL LIMITS TO THE $EPFD_{down}$ RADIATED BY NON-GSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[1]

Frequency band (GHz) for International allocations	$EPFD_{down}$dB(W/m^2)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter[2] (m)	Orbital inclination of GSO satelite (degrees)
Prior to 31 December 2005: 10.7-11.7 in all Regions; 11.7-12.2 in	−163 −166 −167.5	3 6 9			

Regions 2; 12.2-12.5 in Region 3; and 12.5;-12.75 in Regions 1 and 3	−169.5 100 40	≥18 ≤2.5			
Prior to 31 December 2005: 10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−160 −163 −164.5 −166.5 100 40	3 6 9 ≥18 >2.5 and ≤4.5			
From 31 December 2005: 10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−161.25 −164 −165.5 −167.5 100 40	3 6 9 ≥18 ≤2.5			
From 31 December 2005: 10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−158.25 −161 −162.5 −164.5 100 40	3 6 9 ≥18 >2.5 and ≤4.5			

[1]The operational limits on the $EPFD_{down}$ radiated by non-GSO FSS systems shall be the values given in Table 2G or this table, whichever are the more stringent.

[2]For antenna diameters between the values given in this table, the limits are given by linear interpolation using a linear scale for $EPFD_{down}$ in decibels and a logarithmic scale for antenna diameter in meters.

NOTE TO PARAGRAPH (J): These limits relate to the operational equivalent power flux-density which would be obtained under free-space propagation conditions, for all conditions, for all methods of modulation and for the specified inclined GSO FSS operations.

(k) In the 12.75-13.15 GHz, 13.2125-13.25 GHz and 13.75-14.5 GHz bands, the equivalent power flux-density, in the Earth-to-space direction, ($EPFD_{up}$) produced at any point on the geostationary satellite orbit (GSO) by the emissions from all co-frequency earth stations in a non-geostationary satellite orbit Fixed-Satellite Service (NGSO FSS) system, for all conditions and for all methods of modulation, shall not exceed the following limits for the specified percentages of time limits:

LIMITS TO THE $EPFD_{UP}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS

Frequency band (GHz) for International Allocations	**$EPFD_{up}$dB(W/m^2)**	**Percentage of time during which $EPFD_{up}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[1]**
12.5-12.75; 12.75-13.25; 13.75-14.5	−160	100	40	4° ITU-R S.672-4, Ls=−20

[1]For the case of $L_s = -10$, the values a = 1.83 and b = 6.32 should be used in the equations in the Annex of Recommendation ITU-R S.672-4 for single-feed circular beams. In all cases of L_s, the parabolic main beam equation should start at zero.

NOTE TO PARAGRAPH (K): These limits relate to the uplink equivalent power flux density, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(l) In the 11.7-12.2 GHz and 12.5-12.75 GHz bands in Region 3, 11.7-12.5 GHz bands in Region 1, and 12.2-12.7 GHz band in Region 2, the single-entry equivalent power-flux density, in the space-to-Earth direction, ($EPFD_{down}$), at any point on the Earth's surface, produced by emissions from all co-frequency space stations of a single non-geostationary-satellite orbit (NGSO) system operating in the Fixed-Satellite Service (FSS) shall not exceed the following limits in Tables 1L and 2L for the given percentages of time:

TABLE 1L—SINGLE-ENTRY $EPFD_{down}$ LIMITS FOR PROTECTION OF 30, 45, 60, 90, 120, 180, 240 AND 300 CM GSO BSS EARTH STATION ANTENNAS[1 2 3 5]

Frequency band (GHz) for international allocations	$EPDF_{down}$dB(W/m²)	Percentage of time during which $EPFD_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[4]
11.7-12.5 in Region 1;	−165.841	0	40	30 cm
1.7-12.2 and 12.5-	−165.541	25		Recommendation ITU-
12.75 in Region 3;	−164.041	96		R
12.2-12.7 in Region 2	−158.6	98.857		BO.1443 Annex 1
	−158.6	99.429		
	−158.33	99.429		
	−158.33	99.429		
		100		
11.7-12.5 in Region 1;	−175.441	0	40	45 cm
1.7-12.2 and 12.5-	−172.441	66		Recommendation ITU-
12.75 in Region 3;	−169.441	97.75		R
12.2-12.7 in Region 2	−164	99.357		BO.1443 Annex 1
	−160.75	99.809		
	−160	99.986		
	−160	100		
11.7-12.5 in Region 1;	−176.441	0	40	60 cm
1.7-12.2 and 12.5-	−173.191	97.8		Recommendation ITU-
12.75 in Region 3;	−167.75	99.371		R
12.2-12.7 in Region 2	−162	99.886		BO. 1443 Annex 1
	−161	99.943		
	−160.2	99.971		
	−160	99.997		
	−160	100		
11.7-12.5 in Region 1;	−178.94	0	40	90 cm
1.7-12.2 and 12.5-	−178.44	33		Recommendation ITU-
12.75 in Region 3;	−176.44	98		R
12.2-12.7 in Region 2	−171	99.429		BO.1443 Annex 1
	−165.5	99.714		
	−163	99.857		
	−161	99.943		
	−160	99.991		
	−160	100		
11.7-12.5 in Region 1;	−182.44	0	40	120 cm

1.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−180.69 −179.19 −178.44 −174.94 −173.75 −173 −169.5 −167.8 −164 −161.9 −161 −160.4 −160	90 98.9 98.9 99.5 99.68 99.68 99.85 99.915 99.94 99.97 99.99 99.998 100		Recommendation ITU-R BO.1443 Annex 1
11.7-12.5 in Region 1; 1.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−184.941 −184.101 −181.691 −176.25 −163.25 −161.5 −160.35 −160 −160	0 33 98.5 99.571 99.946 99.974 99.993 99.999 100	40	180 cm^3 Recommendation ITU-R BO.1443 Annex 1
11.7-12.5 in Region 1; 1.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−187.441 −186.341 −183.441 −178 −161.4 −161.9 −160.5 −160 −160	0 33 99.25 99.786 99.957 99.983 99.994 99.999 100	40	240 cm^2 Recommendation ITU-R BO.1443 Annex 1
11.7-12.5 in Region 1; 1.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−191.941 −189.441 −185.941 −180.5 −173 −167 −162 −160 −160	0 33 99.5 99.857 99.914 99.951 99.983 99.991 100	40	300 cm Recommendation ITU-R BO.1443 Annex 1

[1]For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table 1L, the limits in Table 2L shall also apply in the frequency band listed in Table 1L.

[2]For 240 cm GSO BSS earth station antennas located in Alaska, communicating with GSO BSS satellites at the 91° W.L., 101° W.L., 110° W.L., 119° W.L. and 148° W.L. nominal orbital locations with elevation angles greater than 5°, −167 dB(W/(m^2/40 kHz)) single-entry 100% of the time operational $EPFD_{down}$ limit also applies to receive antennas.

[3]For 180 cm GSO BSS earth station antennas located in Hawaii communicating with GSO BSS satellites that are operational as of December 30, 1999 at the 110° W.L., 119° W.L. and 148° W.L. nominal orbital positions, −162.5 dB(W/(m^2/40 kHz)) single-entry 100% of the time operational $EPFD_{down}$ limit also applies.

[4]Under the section reference pattern of Annex 1 to Recommendation ITU-R BO.1443 shall be used only for the calculation of interference from non-GSO FSS systems into BSS systems.

[5]For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the EPFD levels and logarithmic for the time percentages, with straight line joining the data points.

TABLE 2L—SINGLE-ENTRY $EPFD_{down}$ LIMITS RADIATED BY NON-GSO FSS SYSTEMS AT CERTAIN LATITUDES

100% of the time $EPFD_{down}$ dB(W/(m^2/40 kHz))	Latitude (North or South in degrees)
−160.0	0 ≤| Latitude | ≤57.5
−160.0 + 3.4 (57.5 − | Latitude |)/4	57.5 ≤| Latitude | ≤63.75
−165.3	63.75 ≤| Latitude |

NOTE TO PARAGRAPH (L): These limits relate to the equivalent power flux density, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(m) In the 11.7-12.2 GHz and 12.5-12.75 GHz bands in Region 3, 11.7-12.5 GHz bands in Region 1, and 12.2-12.7 GHz band in Region 2, the aggregate equivalent power-flux density, in the space-to-Earth direction, ($EPFD_{down}$) at any point on the Earth's surface, produced by emissions from all co-frequency space stations of all non-geostationary-satellite orbit systems operating in the Fixed-Satellite Service (FSS) shall not exceed the following limits in Tables 1M and 2M for the given percentages of time:

TABLE 1M—AGGREGATE $EPFD_{down}$ LIMITS FOR PROTECTION OF 30, 45, 60, 90, 120, 180, 240 AND 300 CM GSO BSS EARTH STATION ANTENNAS[1 2 3 5]

Frequency band (GHz) for international allocations	$EPFD_{down}$dB (W/m^2)	Percentage of time during which $EPFD_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[4]
11.7-12.5 in Region 1;	−160.4	0		30 cm
11.7-12.2 and 12.5-	−160.1	25	40	Recommendation ITU-R
12.75 in Region 3; 12.2-	−158.6	96		BO.1443
12.7 in Region 2	−158.6	98		Annex 1.
	−158.33	98		
	−158.33	100		
11.7-12.5 in Region 1;	−170	0		45 cm
11.7-12.2 and 12.5-	−167	66	40	Recommendation ITU-R
12.75 in Region 3; 12.2-	−164	97.75		BO.1443
12.7 in Region 2	−160.75	99.33		Annex 1.
	−160	99.95		
	−160	100		
11.7-12.5 in Region 1;	−171	0		60 cm
11.7-12.2 and 12.5-	−168.75	90	40	Recommendation ITU-R
12.75 in Region 3; 12.2-	−167.75	97.8		BO.1443
12.7 in Region 2	−162	99.6		Annex 1.
	−161	99.8		
	−160.2	99.9		
	−160	99.99		
	−160	100		
11.7-12.5 in Region 1;	−173.75	0		90 cm
11.7-12.2 and 12.5-	−173	33	40	Recommendation ITU-R

12.75 in Region 3; 12.2-12.7 in Region 2	−171 −165.5 −163 −161 −160 −160	98 99.1 99.5 99.8 99.97 100		BO.1443 Annex 1.
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−177 −175.25 −173.75 −173 −169.5 −167.8 −164 −161.9 −161 −160.4 −160	0 90 98.9 98.9 99.5 99.7 99.82 99.9 99.965 99.993 100	40	120 cm Recommendation ITU-R BO.1443 Annex 1.
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−179.5 −178.66 −176.25 −163.25 −161.5 −160.35 −160 −160	0 33 98.5 99.81 99.91 99.975 99.995 100	40	180 cm Recommendation ITU-R BO.1443 Annex 1.
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−182 −180.9 −178 −164.4 −161.9 −160.5 −160 −160	0 33 99.25 99.85 99.94 99.98 99.995 100	40	240 cm Recommendation ITU-R BO.1443 Annex 1.
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	−186.5 −184 −180.5 −173 −167 −162 −160 −160	0 33 99.5 99.7 99.83 99.94 99.97 100	40	300 cm Recommendation ITU-R BO.1443 Annex 1.

[1]For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the aggregate limit shown in Table 1M, the limits in Table 2M shall also apply.

[2]For 240 cm GSO BSS earth station antennas located in Alaska, communicating with GSO BSS satellites at the 91° W.L., 101° W.L., 110° W.L., 119° W.L. and 148° W.L. nominal orbital locations with elevation angles greater than 5°, −167 dB(W/(m^2/40 kHz)) aggregate 100% of the time operational $EPFD_{down}$ limit also applies to receive antennas.

[3]For 180 cm GSO BSS earth station antennas located in Hawaii communicating with GSO BSS satellites that are operational as of December 30, 1999 at the 110° W.L., 119° W.L. and 148° W.L. nominal orbital positions, −162.5 dB(W/(m^2/40 kHz)) aggregate 100% of the time operational $EPFD_{down}$ limit also applies.

[4]Under the section reference pattern of Annex 1 to Recommendation ITU-R BO.1443 shall be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

[5]For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the EPFD levels and logarithmic for the time percentages, with straight line joining the data points.

TABLE 2M—AGGREGATE $EPFD_{down}$ LIMITS RADIATED BY NON-GSO FSS SYSTEMS AT CERTAIN LATITUDES

00% of the time $EPFD_{down}$ dB(W/(m²/40 kHz))	**Latitude (North or South in degrees)**
160.0	0 ≤| Latitude | ≤57.5.
160.0 + 3.4 (57.5 − | Latitude |)/4	57.5 ≤| Latitude | ≤63.75.
165.3	63.75 ≤| Latitude |.

NOTE TO PARAGRAPH (M): These limits relate to the equivalent power flux density, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

(n) The power-flux density at the Earth's surface produced by emissions from a space station in the Fixed-Satellite Service (space-to-Earth), for all conditions and for all methods of modulation, shall not exceed the limits given in Table N. These limits relate to the power flux-density which would be obtained under assumed free-space conditions.

TABLE N—LIMITS OF POWER-FLUX DENSITY FROM SPACE STATIONS IN THE BAND 6700-7075 MHZ

Frequency band	**Limit in dB (W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
	0°-5°	**5°-25°**	**25°-90°**	
6700-6825 MHz	−137	−137 + 0.5(δ−5)	−127	1 MHz.
6825-7075 MHz	−154 and	−154 + 0.5(δ−5) and	−144 and	4 kHz.
	−134	−134 + 0.5(δ−5)	−124	1 MHz.

(o) ~~In~~ The ~~band 12.2-12.7 GHz, for NGSO FSS space stations, the specified low-angle~~ power flux-density at the Earth's surface produced by emissions from a space station ~~shall not be exceeded into an operational MVDDS receiver:~~

in ~~(1) −158 dB(W/m²) in any 4 kHz band for angles of arrival between 0 and 2 degrees above the horizontal plane; and~~

~~(2) −158 + 3.33(δ−2) dB(W/m²) in any 4 kHz band for angles of arrival (δ) (in degrees) between 2 and 5 degrees above the horizontal plane.~~

~~NOTE-TO-PARAGRAPH (O): These limits relate to the power flux-density, which would be obtained under assumed free-space propagation conditions.~~

~~(p) The power flux-density at the Earth's surface produced by emissions from a space station in~~ either the Earth exploration-satellite service in the band 25.5-27 GHz or the inter-satellite service in the band 25.25-27.5 GHz for all conditions and for all methods of modulation shall not exceed the following values:

−115 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−115 + 0.5(−5) dB(W/m²) in any 1 MHz band for angles of arrival between 5 and 25 degrees above the horizontal plane;

−105 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux-density which would be obtained under assumed free-space propagation conditions.

(p) [Reserved]

(q) In the band 37.5-40.0 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station for all methods of modulation shall not exceed the following values.

(1) This limit relates to the power flux-density which would be obtained under assumed free space conditions (that is, when no allowance is made for propogation impairments such as rain-fade):

−139 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−139 + 4/3 (δ−5) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 20 degrees above the horizontal plane; and

−119 + 0.4 (δ−20) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 20 and 25 degrees above the horizontal plane;

−117 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

(2) This limit relates to the maximum power flux-density which would be obtained anywhere on the surface of the Earth during periods when FSS system raises power to compensate for rain-fade conditions at the FSS Earth station:

−127 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−127 + 4/3 (δ−5) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 20 degrees above the horizontal plane; and

−107 + 0.4 (δ−20) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 20 and 25 degrees above the horizontal plane;

−105 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

NOTE TO PARAGRAPH (Q): The conditions under which satellites may exceed the power flux-density limits for normal free space propagation described in paragraph (p)(1) to compensate for the effects of rain fading are under study and have therefore not yet been defined. Such conditions and the extent to which these limits can be exceeded will be the subject of a further rulemaking by the Commission on the satellite service rules.

(r) In the band 37.5-40.0 GHz, the power flux-density at the Earth's surface produced by emissions from a non-geostationary space station for all methods of modulation shall not exceed the following values:

(1) This limit relates to the power flux-density which would be obtained under assumed free space conditions (that is, when no allowance is made for propogation impairments such as rain-fade):

−132 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−132 + 0.75 (δ−5) dB(W/m^2) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

−117 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

(2) This limit relates to the maximum power flux-density which would be obtained anywhere on the surface of the Earth during periods when FSS system raises power to compensate for rain-fade conditions at the FSS Earth station:

−120 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−120 + 0.75 (δ−5) dB(W/m^2) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

−105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

NOTE TO PARAGRAPH (R): The conditions under which satellites may exceed these power flux-density limits for normal free space propagation described in paragraph (q)(1) to compensate for the effects of rain fading are under study and have therefore not yet been defined. Such conditions and the extent to which these limits can be exceeded will be the subject of a further rulemaking by the Commission on the satellite service rules.

(s) In the 40.0-40.5 GHz band, the power flux density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the following values:

−115 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−115 + 0.5 (δ−5) dB(W/m^2) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

−105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

NOTE TO PARAGRAPH (S): These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(t) In the band 40.5-42.0 GHz, the power flux density at the Earth's surface produced by emissions from a non-geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

−115 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−115 + 0.5 (δ−5) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

−105 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

NOTE TO PARAGRAPH (T): These limits relate to the power flux density that would be obtained under assumed free-space propagation conditions.

(u) In the band 40.5-42.0 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

−120 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−120 + (δ−5) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 15 degrees above the horizontal plane;

−110 + 0.5 (δ−15) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 15 and 25 degrees above the horizontal plane; and

−105 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

NOTE TO PARAGRAPH (U): These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(v) In the band 2496-2500 MHz, the power flux-density at the Earth's surface produced by emissions from non-geostationary space stations for all conditions and all methods of modulation shall not exceed the following values (these values are obtained under assumed free-space propagation conditions):

(1) −144 dB (W/m^2) in 4 kHz for all angles of arrival between 0 and 5 degrees above the horizontal plane; −144 dB (W/m^2) + 0.65(δ −5) in 4 kHz for all angles of arrival between 5 and 25 degrees above the horizontal plane; and

−131 dB (W/m^2) in 4 kHz and for all angles of arrival between 25 and 90 degrees above the horizontal plane.

(2) −126 dB (W/m^2) in 1 MHz for all angles of arrival between 0 and 5 degrees above the horizontal plane; −126 dB (W/m^2) + 0.65(δ −5) in 1 MHz for all angles of arrival between 5 and 25 degrees above the horizontal plane; and

−113 dB (W/m^2) in 1 MHz and for all angles of arrival between 25 and 90 degrees above the horizontal plane.

(w) The power flux density at the Earth's surface produced by emissions from a 17/24 GHz BSS space station operating in the 17.3-17.7 GHz band for all conditions and all methods of modulation must

not exceed the regional power flux density levels prescribed in paragraphs (w)(1) through (4) of this section.

(1) In the region of the contiguous United States, located south of 38° North Latitude and east of 100 West Longitude: −115 dBW/m²/MHz.

(2) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: −118 dBW/m²/MHz.

(3) In the region of the contiguous United States, located west of 100 West Longitude: −121 dBW/m²/MHz.

(4) For all regions outside of the contiguous United States including Alaska and Hawaii: −115 dBW/m²/MHz.

NOTE TO PARAGRAPH (W): These limits pertain to the power flux-density that would be obtained under assumed free-space propagation conditions.

[48 FR 40255, Sept. 6, 1983]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §25.208, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov.*

PART 30 – LOWER AND UPPER MICROWAVE FLEXIBLE USE SERVICE

Subpart A – General

Subpart B – Applications and Licenses

Subpart C – Technical Standards

Subpart D – Competitive Bidding Procedures

Subpart E - Special Provisions for Fixed Point-to-Point, Fixed Point-to-Multipoint Hub Stations, and Fixed Point-to-Multipoint User Stations

Authority: 47 U.S.C. 151, 152, 153, 154, 301, 303, 304, 307, 309, 310, 316, 332, 1302.

Subpart A – General

§ 30.1 Creation of upper microwave flexible use service~~, scope and authority~~ and lower microwave flexible use service.

As of [effective date of final rule], Local Multipoint Distribution Service licenses for the 27.5-28.35 GHz band, and licenses issued in the 38.6-40 GHz band under the rules in part 101 of this chapter shall be reassigned to the Upper Microwave Flexible Use Service~~.~~, and licenses issued in the 12.2-12.7 GHz band shall be reassigned to the Lower Microwave Flexible Use Service. Local Multipoint Distribution Service licenses in bands other than 27.5-28.35 GHz shall remain in that service and shall be governed by the part 101 of this chapter applicable to that service.

§ 30.2 Definitions.

The following definitions apply to this part:

Authorized bandwidth. The maximum width of the band of frequencies permitted to be used by a station. This is normally considered to be the necessary or occupied bandwidth, whichever is greater. (See § 2.202 of this chapter).

Authorized frequency. The frequency, or frequency range, assigned to a station by the Commission and specified in the instrument of authorization.

Fixed satellite earth station. An earth station intended to be used at a specified fixed point.

Light Detection and Ranging (LiDAR). A remote sensing method using lasers to measure distances.

Local Area Operations. Operations confined to physical facility boundaries, such as a factory.

Lower Microwave Flexible Use Service (LMFUS). A mobile or fixed microwave service licensed in the 12.2-12.7 GHz band that provides various wireless services. Aeronautical operations are prohibited.

Point-to-Multipoint Hub Station. A fixed point-to-multipoint radio station that provides one-way or two-way communication with fixed Point-to-Multipoint Service User Stations.

Point-to-Multipoint User Station. A fixed radio station located at users' premises, lying within the coverage area of a Point-to-Multipoint Hub station, using a directional antenna to receive one-way communications from or providing two-way communications with a fixed Point-to-Multipoint Hub Station.

Point-to-Multipoint Service. A fixed point-to-multipoint radio service consisting of point-to-multipoint hub stations that communicate with fixed point-to-multipoint user stations.

Point-to-point station. A station that transmits a highly directional signal from a fixed transmitter location to a fixed receive location.

Portable device. Transmitters designed to be used within 20 centimeters of the body of the user.

Prior coordination. A bilateral process conducted prior to filing applications which includes the distribution of the technical parameters of a proposed radio system to potentially affected parties for their evaluation and timely response.

Secondary operations. Radio communications which may not cause interference to operations authorized on a primary basis and which are not protected from interference from these primary operations

Transportable Station. Transmitting equipment that is not intended to be used while in motion, but rather at stationary locations.

Universal Licensing System. The Universal Licensing System (ULS) is the consolidated database, application filing system, and processing system for all Wireless Radio Services. ULS supports electronic filing of all applications and related documents by applicants and licensees in the Wireless Radio Services, and provides public access to licensing information.

§ 30.3 Eligibility.

Any entity who meets the technical, financial, character, and citizenship qualifications that the Commission may require in accordance with such Act, other than those precluded by Section 310 of the Communications Act of 1934, as amended, 47 U.S.C. 310, is eligible to hold a license under this part.

§ 30.4 Frequencies.

(a) The following frequencies are available for assignment in the Lower Microwave Flexible Use Service:

(1) 12.2 – 12.7 GHz band

(b) The following frequencies are available for assignment in the Upper Microwave Flexible Use Service:

(~~a~~1) 27.5 GHz – 28.35 GHz band - 27.5-27.925 GHz and 27.925-28.35 GHz.

(~~b~~2) 38.6-40 GHz band:

(~~1~~i) New channel plan:

Channel Number	Frequency band limits (MHz)
1	38,600-38,800
2	38,800-39,000
3	39,000-39,200
4	39,200-39,400
5	39,400-39,600
6	39,600-39,800
7	39,800-40,000

(~~2~~ii) Pending transition to the new channel plan, existing 39 GHz licensees licensed under part 101 of this chapter may continue operating on the following channel plan:

Channel Group A		Channel Group B	
Channel No.	Frequency band limits (MHz)	Channel No.	Frequency band limits (MHz)
1-A	38,600-38,650	1-B	39,300-39,350
2-A	38,650-38,700	2-B	39,350-39,400

3-A	38,700-38,750	3-B	39,400-39,450
4-A	38,750-38,800	4-B	39,450-39,500
5-A	38,800-38,850	5-B	39,500-39,550
6-A	38,850-38,900	6-B	39,550-39,600
7-A	38,900-38,950	7-B	39,600-39,650
8-A	38,950-39,000	8-B	39,650-39,700
9-A	39,000-39,050	9-B	39,700-39,750
10-A	39,050-39,100	10-B	39,750-39,800
11-A	39,100-39,150	11-B	39,800-39,850
12-A	39,150-39,200	12-B	39,850-39,900
13-A	39,200-39,250	13-B	39,900-39,950
14-A	39,250-39,300	14-B	39,950-40,000

(~~c~~3) 37-38.6 GHz band: 37,600-37,800 MHz; 37,800-38,000 MHz; 38,000-38,200 MHz; 38,200-38,400 MHz, and 38,400-38,600 MHz. The 37,000-37,600 MHz band segment shall be available on a site-specific, coordinated shared basis with eligible Federal entities.

§ 30.5 Service areas.

(a) Except as noted in paragraphs (b), and (c) of this section, and except for the shared 37-37.6 GHz band, the service areas for the Upper Microwave Flexible Use Service are Partial Economic Areas.

(b) For the 27.5-28.35 GHz band, the service areas shall be counties.

(c) Common Carrier Fixed Point-to-Point Microwave Stations licensed in the 38.6-40 GHz bands licensed with Rectangular Service Areas shall maintain their Rectangular Service Area as defined in their authorization. The frequencies associated with Rectangular Service Area authorizations that have expired, cancelled, or otherwise been recovered by the Commission will automatically revert to the applicable county licensee.

(d) In the 37.5-40 GHz band, Upper Microwave Flexible Use Service licensees shall not place facilities within the protection zone of Fixed-Satellite Service earth stations authorized pursuant to § 25.136 of part 25 of this chapter, absent consent from the Fixed-Satellite Service earth station licensee.

(e) LMFUS in the 12.2-12.7 GHz band is licensed on the basis of Designated Market Areas (DMAs). The 214 DMA service areas are based on the 210 Designated Market Areas delineated by Nielsen Media Research and published in its publication entitled U.S. Television Household Estimates, September 2002, plus four Commission-defined DMA-like service areas:

(1) Alaska—Balance of State (all geographic areas of Alaska not included in Nielsen's three DMAs for the state: Anchorage, Fairbanks, and Juneau);

(2) Guam and the Northern Mariana Islands;

(3) Puerto Rico and the United States Virgin Islands; and

(4) American Samoa.

§ 30.6 Permissible communications.

(a) A licensee in the frequency bands specified in § 30.4 may provide any services for which its frequency bands are allocated, as set forth in the non-Federal Government column of the Table of Frequency Allocations in § 2.106 of this chapter (column 5).

(b) Fixed-Satellite Service shall be provided in a manner consistent with part 25 of this chapter.

§ 30.7 37-37.6 GHz Band – Shared Coordinated Service.

(a) The 37-37.6 GHz band will be available for site-based registrations on a coordinated basis with co-equal eligible Federal entities.

(b) Any non-Federal entity meeting the eligibility requirements of § 30.3 of this part may operate equipment that complies with the technical rules of this part pursuant to a Shared Access License.

(c) Licensees in the 37-37.6 GHz band must register their individual base stations and access points prior to placing them in operation.

§ 30.8 5G Provider Cybersecurity Statement Requirements.

(a) Statement. Each Upper Microwave Flexible Use Service and Lower Microwave Flexible Use Service licensee is required to submit to the Commission a Statement describing its network security plans and related information, which shall be signed by a senior executive within the licensee's organization with personal knowledge of the security plans and practices within the licensee's organization. The Statement must contain, at a minimum, the following elements:

(1) Security Approach. A high-level, general description of the licensee's approach designed to safeguard the planned network's confidentiality, integrity, and availability, with respect to communications from:

(i) A device to the licensee's network;

(ii) One element of the licensee's network to another element on the licensee's network;

(iii) The licensee's network to another network; and

(iv) Device to device (with respect to telephone voice and messaging services).

(2) Cybersecurity Coordination. A high-level, general description of the licensee's anticipated approach to assessing and mitigating cyber risk induced by the presence of multiple participants in the band. This should include the high level approach taken toward ensuring consumer network confidentiality, integrity, and availability security principles, are to be protected in each of the following use cases: communications between a wireless device and the licensee's network; communications within and between each licensee's network; communications between mobile devices that are under end-to-end control of the licensee; and communications between mobile devices that are not under the end-to-end control of the licensee;

(3) Cybersecurity Standards and Best Practices. A high-level description of relevant cybersecurity standards and practices to be employed, whether industry-recognized or related to some other identifiable approach;

(4) Participation with Standards Bodies, Industry-Led Organizations. A description of the extent to which the licensee participates with standards bodies or industry-led organizations pursuing the development or maintenance of emerging security standards and/or best practices;

(5) Other Security Approaches. The high-level identification of any other approaches to security, unique to the services and devices the licensee intends to offer and deploy; and

(6) Plans with Information Sharing and Analysis Organizations. Plans to incorporate relevant outputs from Information Sharing and Analysis Organizations (ISAOs) as elements of the licensee's security architecture. Plans should include comment on machine-to-machine threat information sharing, and any use of anticipated standards for ISAO-based information sharing.

(b) Timing. Each Upper Microwave Flexible Use Service and Lower Microwave Flexible Use Service licensee shall submit this *Statement* to the Commission within three years after grant of the license, but no later than six months prior to deployment.

(c) Definitions. The following definitions apply to this section:

Confidentiality: the protection of data from unauthorized access and disclosure, both while at rest and in transit.

Integrity: the protection against the unauthorized modification or destruction of information.

Availability: the accessibility and usability of a network upon demand.

Subpart B – Applications and Licenses

§ 30.101 Initial authorizations.

Except with respect to in the 37-37.6 GHz band, an applicant must file a single application for an initial authorization for all markets won and frequency blocks desired. Initial authorizations shall be granted in accordance with § 30.4. Applications for individual sites are not required and will not be accepted, except where required for environmental assessments, in accordance with §§ 1.1301 through 1.1319 of this chapter.

§ 30.102 Transition of existing multichannel video distribution and data service licenses.

As of [**effective date of the final rule**], Lower Microwave Flexible Use Service licensees shall be permitted to offer services consistent with § 30.6(a) of this part.

§ ~~30.102~~30.103 Authorization of operation of local area networks in 37-38.6 GHz band.

§ ~~30.103~~30.104 Transition of existing local multipoint distribution service and 39 GHz licenses.

Local Multipoint Distribution Service licenses in the 27.5 – 28.35 GHz band issued on a Basic Trading Area basis shall be ~~disaggregated~~partitioned into county-based licenses and 39 GHz licenses issued on an Economic Area basis shall be ~~disaggregated~~partitioned into Partial Economic Area-based licenses on [effective date of final rule]. For each county in the Basic Trading Area or Partial Economic Area in the Economic Area which is part of the original license, the licensee shall receive a separate license. If there is a co-channel Rectangular Service Area licensee within the service area of a 39 GHz Economic Area licensee, the ~~disaggregated~~partitioned license shall not authorize operation ~~with~~within the service area of the Rectangular Service Area license.

§ ~~30.104~~30.105 License term.

Initial authorizations will have a term not to exceed ten years from the date of initial issuance or renewal.

§ ~~30.105~~30.106 Construction requirements.

(a) Upper Microwave Flexible Use Service and Lower Microwave Flexible Use Service licensees must make a buildout showing as part of their renewal applications. Licensees relying on mobile or point-to-multipoint service to demonstrate that they are providing reliable signal coverage and service to at least 40 percent of the population within the service area of the licensee, and that they are using facilities to provide service in that area either to customers or for internal use. Licensees relying on point-to-point service must demonstrate that they have four links operating and providing service, either to customers or for internal use~~.~~, if the population within the license area is equal to or less than 268,000. If the population within the license area is greater than 268,000, a licensee relying on point-to-point service must demonstrate it has at least one link in operation and providing service for each 67,000 population within the license area.

(b) ~~Showings that rely~~Upper Microwave Flexible Use Service and Lower Microwave Flexible Use Service licensees relying on a combination of multiple types of service ~~will be evaluated on a case-by-case basis.~~must demonstrate a total number of mobile and fixed links that, in combination, represent the equivalent of the amount of coverage required for a fixed or mobile deployment. Licensees deploying both mobile and fixed links would receive "credit" toward the mobile population-coverage requirement for each fixed link deployed, or "credit" toward the fixed link requirements for certain percentages of mobile population covered.

The relationship is expressed in the following formulas. In both of the following formulas, P represents the market population, y is the number of links built in the hybrid market, and x is the percentage of the population covered by mobile service in the hybrid market (expressed as a decimal):

$$y = \max\left(\frac{P}{67000}, 4\right) - 2.5x * \max\left(\frac{P}{67000}, 4\right)$$

The following formula provides the mobile population coverage needed for a given number of fixed links:

$$x = \frac{\max\left(\frac{P}{67000}, 4\right) - y}{2.5 * \max\left(\frac{P}{67000}, 4\right)}$$

These formulas apply for hybrid deployments in which $0 < x < 0.4$ and $0 < y < \max(P/67000,4)$.

(c) If a licensee in this service is also a Fixed-Satellite Service licensee and uses the spectrum covered under its UMFUS license in connection with a satellite earth station, it can demonstrate compliance with the requirements of this section by demonstrating that the earth station in question is in service, operational, and using the spectrum associated with the license. This provision can only be used to demonstrate compliance for the county in which the earth station is located.

(d) The population in the geographic areas in which deployments in the Upper Microwave Flexible Use Service or the Lower Microwave Flexible Use Service are not permitted pursuant to section 30.205 of this rule part shall be excluded when making determinations of buildout showings that UMFUS and LMFUS licensees must demonstrate pursuant to paragraphs (a) and (b) of this section.

(~~d~~e) Failure to meet this requirement will result in automatic cancellation of the license. In bands licensed on a Partial Economic Area basis, and bands licensed for LMFUS pursuant to section 30.5(e), licensees will have the option of partitioning a license on a county basis in order to reduce the population within the license area to a level where the licensee's buildout would meet one of the applicable performance metrics.

(~~e~~f) Existing 28 GHz and 39 GHz licensees shall be required to make a showing pursuant to this rule by June 1, 2024. Existing 12.2-12.7 GHz licensees shall be required to make a showing pursuant to this rule by [**eight years from the effective date of this rule**].

§ ~~30.106~~30.107 Geographic partitioning and spectrum disaggregation.

(a) Parties seeking approval for partitioning and disaggregation shall request from the Commission an authorization for partial assignment of a license pursuant to § 1.948 of this chapter. Upper Microwave Flexible Use Service and Lower Microwave Flexible Use Service licensees may apply to partition their licensed geographic service area or disaggregate their licensed spectrum at any time following the grant of their licenses.

(b) Technical standards—(1) Partitioning. In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to § 1.948 of this chapter and list the partitioned service area on a schedule to the application. The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83).

(2) Spectrum may be disaggregated in any amount.

(3) The Commission will consider requests for partial assignment of licenses that propose combinations of partitioning and disaggregation.

(4) For purposes of partitioning and disaggregation, part 30 systems must be designed so as not to exceed the signal level specified for the particular spectrum block in § 30.204 at the licensee's service area boundary, unless the affected adjacent service area licensees have agreed to a different signal level.

(c) License term. The license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the original licensee's license term as provided for in § ~~30.104~~30.105.

(d)(1) Parties to partitioning agreements must satisfy the construction requirements set forth in § ~~30.105~~30.106 by the partitioner and partitionee each certifying that it will independently meet the construction requirement for its respective partitioned license area. If the partitioner or partitionee fails to meet the construction requirement for its respective partitioned license area, then the relevant partitioned license will automatically cancel.

(2) Parties to disaggregation agreements must satisfy the construction requirements set forth in § ~~30.105~~30.106 by the disaggregator and disaggregatee each certifying that it will independently meet the construction requirement for its respective disaggregated license area. If the disaggregator or disaggregatee fails to meet the construction requirement for its respective disaggregated license area, then the relevant disaggregated license will automatically cancel.

§ ~~30.107~~30.108 Discontinuance of service.

(a) An Upper Microwave Flexible Use License or Lower Microwave Flexible Use authorization will automatically terminate, without specific Commission action, if the licensee permanently discontinues service after the initial license term.

(b) For licensees with common carrier regulatory status, permanent discontinuance of service is defined as 180 consecutive days during which a licensee does not provide service to at least one subscriber that is not affiliated with, controlled by, or related to the licensee in the individual license area. For licensees with non-common carrier status, permanent discontinuance of service is defined as 180 consecutive days during which a licensee does not operate.

(c) A licensee that permanently discontinues service as defined in this section must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 requesting license cancellation. An authorization will automatically terminate, without specific Commission action, if service is permanently discontinued as defined in this section, even if a licensee fails to file the required form requesting license cancellation.

Subpart C – Technical Standards

§ 30.201 Equipment authorization.

(a) Except as provided under paragraph (c) of this section, each transmitter utilized for operation under this part must be of a type that has been authorized by the Commission under its certification procedure.

(b) Any manufacturer of radio transmitting equipment to be used in these services may request equipment authorization following the procedures set forth in subpart J of part 2 of this chapter. Equipment authorization for an individual transmitter may be requested by an applicant for a station authorization by following the procedures set forth in part 2 of this chapter.

(c) Unless specified otherwise, transmitters for use under the provisions of subpart E of this part for fixed point-to-point microwave and point-to-multipoint services must be a type that has been verified for compliance.

§ 30.202 Power limits.

(a) For LMFUS and UMFUS fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz.

(b) For LMFUS and UMFUS mobile stations, the average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.

(c) For LMFUS and UMFUS transportable stations, as defined in § 30.2, the average power of the sum of all antenna elements is limited to a maximum EIRP of +55 dBm.

(d) For LMFUS and UMFUS fixed point-to-point and point-to-multipoint limits see § 30.405.

§ 30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel

bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

(b)(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

(c) For fixed point-to-point and point-to-multipoint limits see § 30.404.

§ 30.204 ~~Field strength limits~~Interference Protection Criteria.

(a) Base/Mobile Operations: The predicted or measured Power Flux Density (PFD) from any Base Station operating in the 27.5-28.35 GHz band, 37-38.6 GHz band, and 38.6-40 GHz bands at any location on the geographical border of a licensee's service area shall not exceed -76dBm/m^2/MHz (measured at 1.5 meters above ground) unless the adjacent affected service area licensee(s) agree(s) to a different PFD.

(b) Fixed Point-to-point Operations:

(1) Prior to operating a fixed point-to-point transmitting facility in the 27,500-28,350 MHz band where the facilities are located within 20 kilometers of the boundary of the licensees authorized market area, the licensee must complete frequency coordination in accordance with the procedures specified in § 101.103 (d)(2) of this chapter with respect to neighboring licensees that may be affected by its operations.

(2) Prior to operating a fixed point-to-point transmitting facility in the 37,000 – 40,000 MHz band where the facilities are located within 16 kilometers of the boundary of the licensees authorized market area, the licensee must complete frequency coordination in accordance with the procedures specified in § 101.103 (d)(2) of this chapter with respect to neighboring licensees that may be affected by its operations.

(c) LMFUS Operations: To accommodate co-primary Direct Broadcast Satellite Service earth stations, an LMFUS transmitting system must not exceed the EPFD levels specified in this section at any DBS subscriber location of record in accordance with the procedures listed in § 30.205 of this part.

(1) Definition of equivalent power flux density: The equivalent power flux density (EPFD) is the power flux density produced at a direct broadcast service (DBS) receive earth station, taking into account shielding effects and the off-axis discrimination of the receiving antenna assumed to be pointing at the appropriate DBS satellite(s) from the transmitting antenna of a Lower Microwave Flexible Use Service (LMFUS) transmit station. The EPFD in dBW/m^2 in the reference bandwidth is calculated using the following formula:

$$EPFD = 10 * \log_{10}\left[\frac{P_{out} * G_m(\theta_m, \phi_m) * G_e(\theta_e, \phi_e) * I}{G_{e\max} * 4 * \pi * d^2}\right]$$

Where:

P_{out} = Total output power of the LMFUS transmitter (watts) into antenna

G_m (θ_m,φ_m = Gain of the LMFUS antenna in the direction of the DBS earth station

G_e (θ_e,φ_e = Gain of the earth station in the direction of the LMFUS antenna

I = Interference scaling factor for the earth station (1 dB for LMFUS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.,* a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report available at *http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf*).

$G_{e,\ max}$ = Maximum gain of the DBS earth station

d = the distance between the LMFUS transmitting antenna and the DBS earth station (meters)

(2) Regional equivalent power flux density levels:

(A) −168.4 dBW/m^2/4kHz in the Eastern region consisting of the District of Columbia and the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida;

(B) −169.8 dBW/m^2/4kHz in the Midwestern region consisting of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas;

(C) −171.0 dBW/m^2/4kHz in the Southwestern region consisting of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37° North Latitude);

(D) −172.1 dBW/m^2/4kHz in the Northwestern region consisting of the following states: Washington, Oregon, California (north of 37° North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.

(3) Except for public safety entities, harmful interference protection from LMFUS stations to incumbent point-to-point 12 GHz fixed stations is not required. Incumbent point-to-point private operational fixed 12 GHz stations, except for public safety entities, are required to protect LMFUS stations under the process described in part 101 of this chapter.

§ 30.205 Federal and non-federal coordination requirements.

(a) Licensees in the 37-38 GHz band located within the zones defined by the coordinates in the tables below must coordinate their operations with Federal Space Research Service (space to Earth) users of the band via the National Telecommunications and Information Administration (NTIA). All licensees operating within the zone defined by the 60 dBm/100 MHz EIRP coordinates in the tables below must coordinate all operations. Licensees operating within the area between the zones defined by the 60 dBm and 75 dBm/100 MHz EIRP coordinates in the tables below must coordinate all operations if their base station EIRP is greater than 60 dBm/100 MHz or if their antenna height exceeds 100 meters above ground level. Licensees operating outside the zones defined by the 75 dBm/100 MHz EIRP coordinates in the tables below are not required to coordinate their operations with NTIA.

Table 1: Goldstone, California Coordination Zone

60 dBm/100 MHz EIRP	75 dBm/100 MHz EIRP

Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)
34.69217/-115.6491	34.19524/-117.47963	34.69217/-115.6491	34.19524/-117.47963
35.25746/-115.32041	34.24586/-117.36210	35.25746/-115.32041	34.24586/-117.36210
36.21257/-117.06567	35.04648/-117.03781	36.11221/-116.63632	34.21748/-117.12812
36.55967/-117.63691	35.04788/-117.00949	36.54731/-117.48242	34.20370/-116.97024
36.66297/-118.31017	34.22940/-117.22327	36.73049/-118.33683	34.12196/-116.93109
36.06074/-118.38528	34.20370/-116.97024	36.39126/-118.47307	34.09498/-116.75473
35.47015/-118.39008	34.12196/-116.93109	36.36891/-118.47134	34.13603/-116.64002
35.40865/-118.34353	34.09498/-116.75473	35.47015/-118.39008	34.69217/-115.6591
35.35986/-117.24709	34.19642/-116.72901	35.40865/-118.34353	34.69217/-115.6491
35.29539/-117.21102	34.64906/-116.62741	35.32048/-117.26386	
34.67607/-118.55412	34.44404/-116.31486	34.63725/-118.96736	
34.61532/-118.36919	34.52736/-116.27845	34.55789/-118.36204	
34.91551/-117.70371	34.76685/-116.27930	34.51108/-118.15329	
34.81257/-117.65400	34.69217/-115.6591	34.39220/-118.28852	
34.37411/-118.18385	34.69217/-115.6491	34.38546/-118.27460	
34.33405/-117.94189		34.37524/-118.24191	
34.27249/-117.65445		34.37039/-118.22557	

Table 2: Socorro, New Mexico Coordination Zone

60 dBm/100 MHz EIRP		75 dBm/100 MHz EIRP
Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)
34.83816/-107.66828	33.44401/-108.67876	33.10651/-108.19320
34.80070/-107.68759	33.57963/-107.79895	33.11780/-107.99980
34.56506/-107.70233	33.84552/-107.60207	33.13558/-107.85611
34.40826/-107.71489	33.85964/-107.51915	33.80383/-107.16520
34.31013/-107.88349	33.86479/-107.17223	33.94554/-107.15516
34.24067/-107.96059	33.94779/-107.15038	33.95665/-107.15480
34.10278/-108.23166	34.11122/-107.18132	34.08156/-107.18137
34.07442/-108.30646	34.15203/-107.39035	34.10646/-107.18938
34.01447/-108.31694	34.29643/-107.51071	35.24269/-107.67969
33.86740/-108.48706	34.83816/-107.66828	34.06647/-108.70438
33.81660/-108.51052		33.35946/-108.68902
33.67909/-108.58750		33.29430/-108.65004
33.50223/-108.65470		33.10651/-108.19320

Table 3: White Sands, New Mexico Coordination Zone

60 dBm/100 MHz EIRP		75 dBm/100 MHz EIRP	
Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)	Latitude/Longitude (decimal degrees)
33.98689/-107.15967	31.78455/-106.54058	31.7494/-106.49132	32.88382/-108.16588
33.91573/-107.46301	32.24710/-106.56114	32.24524/-106.56507	32.76255/-108.05679
33.73122/-107.73585	32.67731/-106.53681	32.67731/-106.53681	32.56863/-108.43999
33.37098/-107.84333	32.89856/-106.56882	32.89856/-106.56882	32.48991/-108.50032
33.25424/-107.86409	33.24323/-106.70094	33.04880/-106.62309	32.39142/-108.48959
33.19808/-107.89673	33.98689/-107.15967	33.21824/-106.68992	31.63664/-108.40480
33.02128/-107.87226		33.24347/-106.70165	31.63466/-108.20921
32.47747/-107.77963		34.00708/-107.08652	31.78374/-108.20798
32.31543/-108.16101		34.04967/-107.17524	31.78322/-106.52825
31.79429/-107.88616		33.83491/-107.85971	31.7494/-106.49132

(b) Licensees in the 37-38.6 GHz band located within the zones defined by the coordinates in the table below must coordinate their operations with the Department of Defense via the National Telecommunications and Information Administration (NTIA).

Table - Coordination Areas for Federal Terrestrial Systems

Location	Agency	Coordination Area (Decimal Degrees)
China Lake, CA	Navy	30 kilometer radius centered on latitude 35.59527 and longitude -117.22583 30 kilometer radius centered on latitude 35.52222 and longitude -117.30333 30 kilometer radius centered on latitude 35.76222 and longitude -117.60055 30 kilometer radius centered on latitude 35.69111 and longitude -117.66916

Location	Agency	Coordination Area (Decimal Degrees)
San Diego, CA	Navy	30 kilometer radius centered on latitude 32.68333 and longitude -117.23333
Nanakuli, HI	Navy	30 kilometer radius centered on latitude 21.38333 and longitude -158.13333
Fishers Island, NY	Navy	30 kilometer radius centered on latitude 41.25 and longitude -72.01666
Saint Croix, VI	Navy	30 kilometer radius centered on latitude 17.74722 and longitude -64.88
Fort Irwin, CA	Army	30 kilometer radius centered on latitude 35.26666 and longitude -116.68333
Fort Carson, CO	Army	30 kilometer radius centered on latitude 38.71666 and longitude -104.65
Fort Hood, TX	Army	30 kilometer radius centered on latitude 31.11666 and longitude -97.76666
Fort Bliss, TX	Army	30 kilometer radius centered on latitude 31.8075 and longitude -106.42166
Yuma Proving Ground, AZ	Army	30 kilometer radius centered on latitude 32.48333 and longitude -114.33333
Fort Huachuca, AZ	Army	30 kilometer radius centered on latitude 31.55 and longitude -110.35
White Sands Missile Range, NM	Army	30 kilometer radius centered on latitude 33.35 and longitude -106.3
Moody Air Force Base, GA	Air Force	30 kilometer radius centered on latitude 30.96694 and longitude -83.185
Hurlburt Air Force Base, FL	Air Force	30 kilometer radius centered on latitude 30.42388 and longitude -86.70694

(c) An LMFUS licensee in the 12.2-12.7 GHz band shall not begin operation prior to conducting an analysis as specified in this section to determine that the EPFD from its transmitting antenna do not exceed the values listed for the appropriate region in §30.204(c)(2) for the aggregate area defined by 1 km radius circles around all planned base stations (the "Transmitting Area"), using EPFD calculations based on detailed terrain and building structure characteristics. For LMFUS fixed point-to-point the Transmitting Area shall be the distance in any direction from the transmitter that is the lesser of the distance equivalent to a signal level of -114 dBm/24 MHz or the distance to the first line of sight blockage in that direction. Alternatively, LMFUS licensees may undertake a coordination process with DBS licensees in each Transmitting Area in which the EPFD from the LMFUS transmitting antenna may exceed the values listed for the region in § 30.204(c)(2) to mitigate or eliminate the potential for harmful

interference to the DBS customers in that area.

(1) LMFUS licensees shall conduct a reasonable survey of the Transmitting Area to determine whether the signal levels from its system, under its deployment plans, would exceed the EPFD levels set forth in §30.204(c)(2) within the Transmitting Area. A survey of excess EPFD levels will be deemed reasonable under this paragraph if it:

(i) Utilizes light detection and ranging (LiDAR), stereoscopic high-resolution imagery techniques or other imaging techniques that feature a resolution of at least two-meters in conjunction with the EPFD contour model developed by the Commission and described in Appendix J of the Memorandum Opinion and Order and Second Report and Order, ET Docket No. 98-206 or on the FCC website at https://apps.fcc.gov/edocs_public/attachmatch/FCC-02-116A1.pdf;

(ii) Assumes that one DBS receive antenna exists for every one square meter of the Transmitting Area;

(iii) Assumes that DBS antennas are 18 inches in diameter and located 0.8 meters above the rooftop and uses actual three-dimensional DBS antenna patterns (see section 4.2.1 of the MITRE report, Figures 4-8 and 4-9);

(iv) Assumes five mobiles per mobile base station distributed evenly around cell edge

(v) Excludes from consideration any area in the Transmitting Area where a DBS antenna cannot be positioned, such as (i) a roof with a pitch of 35 degrees or more (does not apply to fixed point-to-point); (ii) a location where an obstacle blocks the proposed DBS antenna's line-of-sight to any DBS satellite; and (iii) a location whose surface or terrain is not suitable for DBS antenna installations (*e.g.*, streets in urban areas);

(vi) Uses the actual building penetration losses for analysis of indoor deployments; and

(vii) Analyzes, based on the assumption set forth in paragraphs (c)(i)-(v) of this section, the likelihood for interference to DBS receivers that could be located on rooftops with line of sight to the fixed transmitters in the 12.2-12.7 GHz band, using the appropriate regional EPFD limit.

(2) If the LMFUS licensee determines the signals will not exceed the EPFD levels set forth in §30.204(c)(2), it shall provide the results of its analysis to DBS licensees in the Transmitting Area for review. If the DBS licensees do not respond or object to the deployment of the system within thirty (30) days, the LMFUS licensee may commence operations. Licensees must also maintain records of the analysis for a period of ten (10) years and make such records available if requested by the Commission during this time.

(3) In those Transmitting Areas in which an LMFUS licensee determines the signal levels from its system would exceed the appropriate EPFD levels, the LMFUS licensee shall commence a coordination process with the DBS licensee(s) in this Transmitting Area.

(i) At least ninety (90) days prior to the planned date of LMFUS commencement of operations, the LMFUS licensee shall provide the following information to the DBS licensee(s) operating in the Transmitting Area with the potential for excess EPFD levels:

(A) Geographic location (including NAD 83 coordinates) of its proposed station location;

(B) Maximum EIRP of each transmitting antenna system;

(C) Height above ground level for each transmitting antenna;

(D) Antenna type along with main beam azimuth and altitude orientation information, and description of the antenna radiation pattern; and

(E) Description of the proposed service area.

(ii) No later than forty-five days after receipt of the notice prescribed in paragraph (3)(i) of this section, the DBS licensee(s) shall provide the LMFUS operator with a list of those DBS customer locations in the area in which the LMFUS providers has identified that the prescribed EPFD limits may be exceeded.

(iii) If no DBS licensee has responded to the LMFUS licensee pursuant to paragraph (3)(ii) of this section, the LMFUS licensee may commence deployment of its system.

(iv) No later than thirty days after receipt of the list prescribed in paragraph (3)(ii) of section, the LMFUS licensee and the DBS licensee(s) shall coordinate to ensure the LMFUS signal levels will not cause harmful interference to the DBS systems. This coordination shall include reasonable measures to prevent harmful interference, up to and including finding a new transmit site for the LMFUS operation.

(4) Any disputes arising from this coordination process shall be referred to the Commission.

(5) Beginning thirty days after the DBS licensees are notified of a potential LMFUS site in paragraph (c)(1) of this section, the DBS licensees are responsible for providing information they deem necessary for those entities who install all future DBS receive antennas on its system to take into account the presence of LMFUS operations so that these DBS receive antennas can be located in such a way as to avoid the LMFUS signal. These later installed DBS receive antennas shall have no further rights of complaint against the notified LMFUS transmitting antenna(s).

(d) (1) LMFUS licensees in the 12.2-12.7 GHz band are required to develop sharing and protection agreements based on the design and architecture of their systems, in order to ensure that no harmful interference occurs between adjacent geographical area licensees. LMFUS licensees shall:

(i) Engineer systems to be reasonably compatible with adjacent and co-channel operations in the adjacent areas on all its frequencies; and

(ii) Cooperate fully and in good faith to resolve interference and transmission problems that are present on adjacent and co-channel operations in adjacent areas.

(2) Harmful interference to public safety stations, co-channel LMFUS stations operating in adjacent geographic areas, and stations operating on adjacent channels to LMFUS stations is prohibited. In areas where the DMAs are in close proximity, careful consideration should be given to power requirements and to the location, height, and radiation pattern of the transmitting and receiving antennas. Licensees are expected to cooperate fully in attempting to resolve problems of potential interference before bringing the matter to the attention of the Commission.

(3) LMFUS licensees shall coordinate their facilities whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area. Licensees are encouraged to develop operational agreements with relevant licensees in the adjacent geographic areas. Incumbent public safety POFS licensee(s) shall retain exclusive rights to its channel(s) within the relevant geographical areas and must be protected in accordance with part 101 of this chapter. A list of public safety incumbents is attached as Appendix I to the Memorandum Opinion and Order and Second

Report and Order, Docket 98-206, released May 23, 2002. Please check with the Commission for any updates to that list.

§ 30.206 International coordination.

Operations in the 12.2-12.7 GHz, 27.5-28.35 GHz, 37-38.6, and 38.6-40 GHz bands are subject to existing and future international agreements with Canada and Mexico.

§ 30.207 RF safety.

Licensees and manufacturers are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.

§ 30.208 Operability.

Mobile and transportable stations that operate on any portion of frequencies within the 12.2-12.7 GHz, 27.5-28.35 GHz or the 37-40 GHz bands must be capable of operating on all frequencies within those particular bands.

§ 30.209 Duplexing.

Stations authorized under this rule part may employ frequency division duplexing, time division duplexing, or any other duplexing scheme, provided that they comply with the other technical and operational requirements specified in this part.

Subpart D – Competitive Bidding Procedures

§ 30.301 Upper microwave flexible use service subject to competitive bidding.

Mutually exclusive initial applications for Upper Microwave Flexible User Service licenses are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

§ 30.302 Designated entities and bidding credits.

(a) Eligibility for small business provisions. (1) A small business is an entity that, together with its affiliates, its controlling interests and the affiliates of its controlling interests, have average gross revenues that are not more than $55 million for the preceding three (3) years.

(2) A very small business is an entity that, together with its affiliates, its controlling interests and the affiliates of its controlling interests, has average gross revenues that are not more than $20 million for the preceding three (3) years.

(b) Bidding credits. A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses may use a bidding credit of 15 percent, as specified in § 1.2110(f)(2)(i)(C) of this chapter. A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses may use a bidding credit of 25 percent, as specified in § 1.2110(f)(2)(i)(B) of this chapter.

(c) A rural service provider, as defined in § 1.2110(f)(4) of this chapter, who has not claimed a small business bidding credit may use a bidding credit of 15 percent bidding credit, as specified in § 1.2110(f)(4)(i) of this chapter.

Subpart E - Special Provisions for Fixed Point-to-Point, Fixed Point-to-Multipoint Hub Stations, and Fixed Point-to-Multipoint User Stations

§ 30.401 Permissible service.

Stations authorized under this subpart may deploy stations used solely as fixed point-to-point stations, fixed point-to-multipoint hub stations, or fixed point-to-multipoint user stations, as defined in § 30.2 of this part, subject to the technical and operational requirements specified in this subpart.

§ 30.402 Frequency tolerance.

The carrier frequency of each transmitter authorized under this sub-part must be maintained within the following percentage of the reference frequency (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency (MHz)	Frequency tolerance (percent)
12,200 to 12,700	0.005
27,500 to 28,350	0.001
38,600 to 40,000	0.03

§ 30.403 Bandwidth.

(a) Stations under this sub-part will be authorized any type of emission, method of modulation, and transmission characteristic, consistent with efficient use of the spectrum and good engineering practice.

(b) The maximum bandwidth authorized per frequency to stations under this sub-part is set out in the table that follows.

Frequency band (MHz)	Maximum authorized bandwidth
12,200 to 12,700	500 MHz
27,500 to 28,350	850 MHz
38,600 to 40,000	200 MHz[1]

[1]For channel block assignments in the 38,600-40,000 MHz bands when adjacent channels are aggregated, equipment is permitted to operate over the full channel block aggregation without restriction.

§ 30.404 Emission limits.

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) When using transmissions other than those employing digital modulation techniques:

(i) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 decibels;

(ii) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 decibels;

(iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(2) When using transmissions employing digital modulation techniques in situations not covered in this section:

(i) In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 11 decibels:

A = 11 + 0.4(P−50) + 10 Log_{10} B. (Attenuation greater than 56 decibels or to an absolute power of less than −13 dBm/1MHz is not required.)

(ii) In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation. The authorized bandwidth includes the nominal radio frequency bandwidth of an individual transmitter/modulator in block-assigned bands. Equipment licensed prior to April 1, 2005 shall only be required to meet this standard in any 4 kHz band.

(iii) The emission mask in paragraph (a)(2)(i) of this section applies only to the band edge of each block of spectrum, but not to subchannels established by licensees. The value of P in the equation is the percentage removed from the carrier frequency and assumes that the carrier frequency is the center of the actual bandwidth used. The emission mask can be satisfied by locating a carrier of the subchannel sufficiently far from the channel edges so that the emission levels of the mask are satisfied. The emission mask shall use a value B (bandwidth) of 40 MHz, for all cases even in the case where a narrower subchannel is used (for instance the actual bandwidth is 10 MHz) and the mean output power used in the calculation is the sum of the output power of a fully populated channel. For block assigned channels, the out-of-band emission limits apply only outside the assigned band of operation and not within the band.

(b) [Reserved]

(c) (1) For operating frequencies in the 12.2-12.7 GHz band for fixed services, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

A = 43 +10 log10(P). (Attenuation greater than 80 decibels or to an absolute power of less than −13 dBm/1MHz is not required.) where:

A = Attenuation (in decibels) below the mean output power level.

P = Percent removed from the center frequency of the transmitter bandwidth.

B = Authorized bandwidth in MHz.

§ 30.405 Transmitter power limitations.

On any authorized frequency, the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the following:

Maximum allowable EIRP	
Frequency band (MHz)	**Fixed (dBW)**
12,200-12,700	+ 55
27,500-28,350[1]	+ 55
38,600-40,000	+ 55

[1]For Point-to-multipoint user stations authorized in these bands, the EIRP shall not exceed 55 dBW or 42 dBW/MHz.

§ 30.406 Directional antennas.

(a) Unless otherwise authorized upon specific request by the applicant, each station authorized under the rules of this sub-part must employ a directional antenna adjusted with the center of the major lobe of radiation in the horizontal plane directed toward the receiving station with which it communicates: provided, however, where a station communicates with more than one point, a multi- or omni-directional antenna may be authorized if necessary.

(b) Fixed stations (other than temporary fixed stations) must employ transmitting and receiving antennas (excluding second receiving antennas for operations such as space diversity) meeting the appropriate performance Standard A indicated below, except that in areas not subject to frequency congestion, antennas meeting performance Standard B may be used. For frequencies with a Standard B1 and a Standard B2, in order to comply with Standard B an antenna must fully meet either Standard B1 or Standard B2. Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(1) With either the maximum beamwidth to 3 dB points requirement or with the minimum antenna gain requirement; and

(2) With the minimum radiation suppression to angle requirement.

Frequency (MHz)	**Category**	**Maximum beamwidth to 3 dB points[1] (included angle in degrees)**	**Minimum antenna gain (dbi)**	**Minimum radiation suppression to angle in degrees from centerline of main beam in decibels**						
				5° to10°	**10° to 15°**	**15° to 20°**	**20° to 30°**	**30° to 100°**	**100° to 140°**	**140° to 180°**
38,600 to 40,000[2]	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36

[1]If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

[2]Stations authorized to operate in the 38,600-40,000 MHz band may use antennas other than those meeting the Category A standard. However, the Commission may require the use of higher performance antennas where interference problems can be resolved by the use of such antennas.

§30.407 Antenna polarization.

In the 12,200-12,700 and 27,500-28,350 MHz band, system operators are permitted to use any polarization within its service area, but only vertical and/or horizontal polarization for antennas located within 20 kilometers of the outermost edge of their service area.

PART 101—FIXED MICROWAVE SERVICES
Subpart A—General

Subpart B—Applications and Licenses

Subpart C—Technical Standards

Subpart D—Operational Requirements

Subpart E—Miscellaneous Common Carrier Provisions

Subpart G—24 GHz Service and Digital Electronic Message Service

Subpart H—Private Operational Fixed Point-to-Point Microwave Service

Subpart I—Common Carrier Fixed Point-to-Point Microwave Service

Subpart J—Local Television Transmission Service

Subpart K [Reserved]

Subpart L—Local Multipoint Distribution Service

Subpart M—Competitive Bidding Procedures for LMDS

Subpart N—Competitive Bidding Procedures for the 38.6-40.0 GHz Band

Subpart O—Multiple Address Systems

Subpart P—~~Multichannel Video Distribution and Data Service Rules for the 12.2-12.7 GHz Band~~[Reserved]

Subpart Q—Service and Technical Rules for the 70/80/90 GHz Bands

Authority: 47 U.S.C. 154, 303.

Source: 61 FR 26677, May 28, 1996, unless otherwise noted.

Subpart A—General

§101.1 Scope and authority.

(a) Part 1 of the Commission's rules contains the general rules of practice and procedure applicable to proceedings before the Commission and for the filing of applications for radio station licenses in the fixed microwave services.

(b) The purpose of the rules in this part is to prescribe the manner in which portions of the radio spectrum may be made available for private operational, common carrier, 24 GHz Service and Local Multipoint Distribution Service fixed, microwave operations that require transmitting facilities on land or in specified offshore coastal areas within the continental shelf.

(c) The rules in this part are issued pursuant to the authority contained in Titles I through III of the Communications Act of 1934, as amended, which vest authority in the Federal Communications Commission to regulate common carriers of interstate and foreign communications, to regulate radio transmissions and issue licenses for radio stations, and to regulate all interstate and foreign communications by wire and radio necessary to the accomplishment of the purposes of the Act.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23163, Apr. 29, 1997; 63 FR 68981, Dec. 14, 1998; 65 FR 59357, Oct. 5, 2000]

§101.3 Definitions.

As used in this part:

24 GHz Service. A fixed point-to-point, point-to-multipoint, and multipoint-to-multipoint radio system in the 24.25-24.45 GHz band and in the 25.05-25.25 GHz band consisting of a fixed main (nodal) station and a number of fixed user terminals. This service may encompass any digital fixed service.

Antenna power gain. The ratio of the maximum radiation intensity to that of an isotropic (omnidirectional) radiator in the far field of its main (forward direction) lobe.

Antenna power input. The radio frequency peak or RMS power, as the case may be, supplied to the antenna from the antenna transmission line and its associated impedance matching network.

Antenna structure. The antenna, its supporting structure and anything attached to it.

Assigned frequency. The center of the frequency band assigned to a station.

Assigned frequency bandwidth. The frequency band within which the emission of a station is authorized; the width of the band equals the necessary bandwidth plus twice the absolute value of the frequency tolerance.

Authorized bandwidth. The maximum bandwidth authorized to be used by a station as specified in the station license. (See §2.202 of this chapter)

Authorized frequency. The frequency, or frequency range, assigned to a station by the Commission and specified in the instrument of authorization.

Authorized power. The maximum power a station is permitted to use. This power is specified by the Commission in the station's authorization.

Automatic Transmitter Power Control (ATPC). ATPC is a feature of a digital microwave radio system that adjusts the transmitter output power. ATPC allows the transmitter to operate at less than maximum power for most of the time. In a radio employing ATPC, the transmit power is reduced during normal operation conditions. When the receiver detects a reduction in signal level, a control signal is sent to the far end transmitter, instructing it to increase the power output to compensate for the signal reduction. The power output is limited to the licensed (maximum) transmit power. Guidelines for use of ATPC are set forth in the TIA Telecommunications Systems Bulletin TSB 10, “Interference Criteria for Microwave Systems (TSB 10).”

Bandwidth occupied by an emission. The band of frequencies comprising 99 percent of the total radiated power extended to include any discrete frequency on which the power is at least 0.25 percent of the total radiated power.

Bit rate. The rate of transmission of information in binary (two state) form in bits per unit time.

Carrier. In a frequency stabilized system, the sinusoidal component of a modulated wave whose frequency is independent of the modulating wave; or the output of a transmitter when the modulating wave is made zero; or a wave generated at a point in the transmitting system and subsequently modulated by the signal; or a wave generated locally at the receiving terminal which when combined with the side bands in a suitable detector, produces the modulating wave.

Carrier frequency. The output of a transmitter when the modulating wave is made zero.

Central office. A landline termination center used for switching and interconnection of public message communication circuits.

Common carrier fixed point-to-point microwave service. A common carrier public radio service rendered on microwave frequencies by fixed and temporary fixed stations between points that lie within the United States or between points to its possessions or to points in Canada or Mexico.

Communication common carrier. Any person engaged in rendering communication service for hire to the public.

Control point. An operating position at which an operator responsible for the operation of the transmitter is stationed and which is under the control and supervision of the licensee.

Control station. A fixed station, the transmissions of which are used to control automatically the emissions or operations of a radio station, or a remote base station transmitter.

Coordination area. The area associated with a station outside of which another station sharing the same or adjacent frequency band neither causes nor is subject to interfering emissions greater than a permissible level.

Coordination contour. The line enclosing the coordination area.

Coordination distance. The distance on a given azimuth from a station beyond which another station neither causes nor is subject to interfering emissions greater than a permissible level.

Digital Electronic Message Nodal Station. A fixed point-to-multipoint radio station in a Digital Electronic Message Service providing two-way communication with Digital Electronic Message User Stations.

Digital Electronic Message Service. A two-way end-to-end fixed radio service utilizing digital termination systems for the exchange of digital information in the frequency bands 10,550-10,680 MHz, 18,820-18,920 MHz, and 19,160-19,260 MHz. This service may also make use of point-to-point microwave facilities, satellite facilities or other communications media to interconnect digital termination systems to comprise a network.

Digital Electronic Message User Station. Any one of the fixed microwave radio stations located at users' premises, lying within the coverage area of a Digital Electronic Message Nodal Station, and providing two-way digital communications with the Digital Electronic Message Nodal Station.

Digital modulation. The process by which some characteristic (frequency, phase, amplitude or combinations thereof) of a carrier frequency is varied in accordance with a digital signal, e.g., one consisting of coded pulses or states.

Drop point. A term used in the point-to-point microwave radio service to designate a terminal point where service is rendered to a subscriber.

Earth station. A station located either on the Earth's surface or within the major portion of Earth's atmosphere and intended for communication:

(1) With one or more space stations; or

(2) With one or more stations of the same kind by means of one or more reflecting satellites or other objects in space.

Effective Radiated Power (ERP). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

Equivalent Isotropically Radiated Power (EIRP). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna.

Exchange. A unit of a communication company or companies for the administration of communication service in a specified area, which usually embraces a city, town, or village and its environs, and consisting of one or more central offices, together with the associated plant, used in furnishing communication service in that area.

Exchange area. The geographic area included within the boundaries of an exchange.

Fixed satellite earth station. An earth station intended to be used at a specified fixed point.

Fixed relay station. A fixed station associated with one or more stations, established to receive radio signals directed to it and to retransmit them automatically on a fixed service frequency.

Fixed service. A radio communications service between specified fixed points.

Fixed station. A station in the fixed service.

Frequency tolerance. The maximum permissible departure by the center frequency of the frequency band occupied by an emission from the assigned frequency or, by the characteristic frequency of an emission from the reference frequency.

NOTE: The frequency tolerance is expressed as a percentage or in Hertzs.

General communication. Two-way voice communication, through a base station, between:

(1) A common carrier land mobile or airborne station and a landline telephone station connected to a public message landline telephone system;

(2) Two common carrier land mobile stations;

(3) Two common carrier airborne stations;

(4) A common carrier land mobile station and a common carrier airborne station.

Harmful interference. Interference that endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with these regulations.

Internodal link. A point-to-point communications link used to provide communications between nodal stations or to interconnect nodal stations to other communications media.

Landing area. A landing area means any locality, either of land or water, including airports and intermediate landing fields, which is used, or approved for use for the landing and take-off of aircraft, whether or not facilities are provided for the shelter, servicing, or repair of aircraft, or for receiving or discharging passengers or cargo.

Local Multipoint Distribution Service Backbone Link. A point-to-point radio service link in a Local Multipoint Distribution Service System that is used to interconnect Local Multipoint Distribution Service Hub Stations with each other or with the public switched telephone network.

Local Multipoint Distribution Service Hub Station. A fixed point-to-point or point-to-multipoint radio station in a Local Multipoint Distribution Service System that provides one-way or two-way communication with Local Multipoint Distribution Service Subscriber Stations.

Local Multipoint Distribution Service Subscriber Station. Any one of the fixed microwave radio stations located at users' premises, lying within the coverage area of a Local Multipoint Distribution Service Hub Station, capable of receiving one-way communications from or providing two-way communications with the Local Multipoint Distribution Service Hub Station.

Local Multipoint Distribution Service System. A fixed point-to-point or point-to-multipoint radio system consisting of Local Multipoint Distribution Service Hub Stations and their associated Local Multipoint Distribution Service Subscriber Stations.

Local television transmission service. A public radio communication service for the transmission of television material and related communications.

Long haul system. A microwave system licensed under this part in which the longest radio circuit of tandem radio paths exceeds 402 kilometers.

Lower Microwave Flexible Use Service (LMFUS). A fixed and mobile microwave service licensed in the 12.2-12.7 GHz band that provides various wireless services. Aeronautical operations are prohibited.

Master station. A station in a multiple address radio system that controls, activates or interrogates four or more remote stations. Master stations performing such functions may also receive transmissions from remote stations.

Message center. The point at which messages from members of the public are accepted by the carrier for transmission to the addressee.

Microwave frequencies. As used in this part, this term refers to frequencies of 890 MHz and above.

Microwave link. A link is defined as a simplex communications circuit between two points utilizing a single frequency/polarization assignment. A duplex communications circuit would require two links, one link in each direction.

Miscellaneous common carriers. Communications common carriers that are not engaged in the business of providing either a public landline message telephone service or public message telegraph service.

Mobile earth station. An earth station intended to be used while in motion or during halts at unspecified points.

Mobile service. A radio communication service between mobile and land stations or between mobile stations.

Mobile station. A station in the mobile service intended to be used while in motion or during halts at unspecified points.

~~*Multichannel Video Distribution and Data Service (MVDDS).* A fixed microwave service licensed in the 12.2-12.7 GHz band that provides various wireless services. Mobile and aeronautical operations are prohibited.~~

Multiple address system (MAS). A point-to-multipoint or point-to-point radio communications system used for either one-way or two-way transmissions that operates in the 928/952/956 MHz, the 928/959 MHz or the 932/941 MHz bands in accordance with §101.147.

National Spatial Reference System. The National Spatial Reference System (NSRS) is the name given to all Geodetic Control information contained in the National Geodetic Survey (NGS) Data Base. This includes: A, B, First, Second, and Third Order horizontal and vertical control observed by NGS as

well as data submitted by other agencies (i.e., USGS, BLM, States, Counties, Cities, and private surveying organizations).

Necessary bandwidth. For a given class of emission, the width of the frequency band that is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions. The necessary bandwidth may be calculated using the formulas in §2.202 of this chapter.

Nodal station. The central or controlling stations in a microwave radio system operating on point-to-multipoint or multipoint-to-multipoint frequencies with one or more user stations or internodal links.

Occupied bandwidth. The width of a frequency bandwidth such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage, B/2 of the total mean power of a given emission. Unless otherwise specified by the CCIR for the appropriate class of emission, the value of B/2 should be taken as 0.5%.

NOTE: The percentage of the total power outside the occupied bandwidth is represented by B.

Operational fixed station. A private fixed station not open to public correspondence.

Passive repeater. A re-radiation device associated with a transmitting/receiving antenna system that re-directs intercepted radiofrequency energy. For example, it may consist of reflector(s) or back-to-back parabolic or horn antennas.

Path length. The total distance of a path from the transmit to the receive antenna, inclusive of all passive repeaters, if any.

Payload capacity. The bit rate available for transmission of data over a radiocommunication system, excluding overhead data generated by the system.

Periscope antenna system. An antenna system which involves the use of a passive reflector to deflect radiation from or to a directional transmitting or receiving antenna which is oriented vertically or near vertically.

Prior coordination. A bilateral process conducted prior to filing applications which includes the distribution of the technical parameters of a proposed radio system to potentially affected parties for their evaluation and timely response.

Private carrier. An entity licensed in the private service and authorized to provide communications service to other private service eligibles on a commercial basis.

Private line service. A service whereby facilities for communication between two or more designated points are set aside for the exclusive use or availability for use of a particular customer and authorized users during stated periods of time.

Private operational fixed point-to-point microwave service. A private radio service rendered by fixed and temporary fixed stations on microwave frequencies for the exclusive use or availability for use of the licensee or other eligible entities for communication between two or more designated points. Service may be provided between points within the United States, points within United States possessions, or between the United States and points in Canada or Mexico.

Public correspondence. Any telecommunication which the offices and stations must, by reason of their being at the disposal of the public, accept for transmission.

Public message service. A service whereby facilities are offered to the public for communication between all points served by a carrier or by interconnected carriers on a non-exclusive message by message basis, contemplating a separate connection for each occasion of use.

Radio station. A separate transmitter or a group of transmitters under simultaneous common control, including the accessory equipment required for carrying on a radiocommunication service.

Radiocommunication. Telecommunication by means of radio waves.

Rated power output. The maximum radio frequency power output capability (peak or average power) of a transmitter, under optimum conditions of adjustment and operation, specified by its manufacturer.

Record communication. Any transmission of intelligence which is reduced to visual record form at the point of reception.

Reference frequency. A frequency having a fixed and specified position with respect to the assigned frequency. The displacement of this frequency with respect to the assigned frequency has the same absolute value and sign that the displacement of the characteristic frequency has with respect to the centre of the frequency band occupied by the emission.

Relay station. A fixed station used for the reception and retransmission of the signals of another station or stations.

Remote station. A fixed station in a multiple address radio system that transmits one-way to one or more central receive sites, controls a master station, or is controlled, activated or interrogated by, and may respond to, a master station.

Repeater station. A fixed station established for the automatic retransmission of radiocommunications received from one or more mobile stations and directed to a specified location; for public mobile radio operations, a fixed station that automatically retransmits the mobile communications and/or transmitter information about the base station, along a fixed point-to-point link between the base station and the central station.

Secondary operations. Radio communications which may not cause interference to operations authorized on a primary basis and which are not protected from interference from these primary operations.

Short haul system. A microwave system licensed under this part in which the longest radio circuit of tandem radio paths does not exceed 402 kilometers.

Signal booster. A device at a fixed location which automatically receives, amplifies, and retransmits on a one-way or two-way basis, the signals received from base, fixed, mobile, and portable stations, with no change in frequency or authorized bandwidth. A signal booster may be either narrowband (Class A), in which case the booster amplifies only those discrete frequencies intended to be retransmitted, or broadband (Class B), in which case all signals within the passband of the signal booster filter are amplified.

Signaling communication. One-way communications from a base station to a mobile or fixed receiver, or to multi-point mobile or fixed receivers by audible or subaudible means, for the purpose of

actuating a signaling device in the receiver(s) or communicating information to the receiver(s), whether or not the information is to be retained in record form.

Standby transmitter. A transmitter installed and maintained for use in lieu of the main transmitter only during periods when the main transmitter is out of service for maintenance or repair.

Symbol rate. Modulation rate in bauds. This rate may be higher than the transmitted bit rate as in the case of coded pulses or lower as in the case of multilevel transmission.

Telegraphy. A form of telecommunication which is concerned in any process providing transmission and reproduction at a distance of documentary matter, such as written or printed matter or fixed images, or the reproduction at a distance of any kind of information in such a form. Unless otherwise specified, telegraphy means a form of telecommunication for the transmission of written matter by the use of signal code.

Telemetering. The use of telecommunication for automatic indicating or recording measurements at a distance from the measuring instrument.

Telephony. A form of telecommunication set up for the transmission of speech, or in some cases, other sounds.

Television. A form of telecommunication for transmission of transient images of fixed or moving objects.

Temporary fixed station. A station established in a non-permanent mode (temporary) at a specified location for a short period of time, ranging up to one year. Temporary-fixed operations are itinerant in nature, and are not to be confused with mobile-type operations.

Universal Licensing System (ULS). The consolidated database, application filing system and processing system for all Wireless Telecommunications Services. The ULS offers Wireless Telecommunications Bureau (WTB) applicants and the general public electronic filing of all applications requests, and full public access to all WTB licensing data.

User or subscriber station. The station(s) in a microwave radio system operating at the users' premises on point-to-multipoint or multipoint-to-multipoint frequencies and communicating with one or more nodal stations.

Video entertainment material. The transmission of a video signal (*e.g.* United States Standard Monochrome or National Television Systems Committee 525-line television) and an associated audio signal which is designed primarily to amuse or entertain, such as movies and games.

[61 FR 26677, May 28, 1996, as amended at 61 FR 29693, June 12, 1996; 61 FR 31052, June 19, 1996; 61 FR 44181, Aug. 28, 1996; 62 FR 23163, Apr. 29, 1997; 63 FR 68981, Dec. 14, 1998; 65 FR 17448, Apr. 3, 2000; 65 FR 38326, June 20, 2000; 65 FR 59357, Oct. 5, 2000; 67 FR 43037, June 26, 2002; 68 FR 4955, Jan. 31, 2003; 77 FR 54432, Sept. 5, 2012]

Subpart B—Applications and Licenses

General Filing Requirements

§101.4 Transition plan.

(a) All systems subject to parts 21 and 94 of this chapter in effect as of July 31, 1996, which are licensed or which are proposed in an application on file, as of July 31, 1996, are subject to the requirements under part 21 or part 94 of this chapter as contained in the CFR edition revised as of October 1, 1995 and amended in the FEDERAL REGISTER through July 31, 1996, as applicable, indefinitely.

(b) For purposes of this section, a "system" shall include:

(1) The originally licensed system;

(2) Any modification to the original system involving a change in antenna azimuth, antenna beam width, channel loading, emission, station location, antenna height, authorized power, or authorized frequencies;

(3) Additional links constructed to complete an integrated communications network; or

(4) Operationally connecting new facilities and/or frequencies.

(c) All radio frequency devices authorized pursuant to part 2 of this chapter as being in compliance with applicable part 21 or part 94 of this chapter in effect as of July 31, 1996, requirements can be used indefinitely with systems licensed under this part 101.

[61 FR 26677, May 28, 1996, as amended at 65 FR 38326, June 20, 2000]

§101.5 Station authorization required.

(a) [Reserved]

(b) A separate application form must be filed electronically via ULS for each Digital Electronic Message Service (DEMS) Nodal Station. No license is required for a DEMS User Station or for a Multiple Address System (MAS) remote or mobile station. Authority for a DEMS Nodal Station licensee to serve a specific number of user stations to be licensed in the name of the carrier must be requested on FCC Form 601 filed for the DEMS Nodal Station. Authority for any number of MAS remotes and authority to serve MAS mobiles (to the extent this part permits such operation) within a specified area will be included in the authority for the MAS fixed master stations.

(c) [Reserved]

(d) For stations authorized under subpart H (Private Operational Fixed Point-to-Point Microwave Service), subpart I (Common Carrier Fixed Point-to-Point Microwave Service), and subpart L of this part (Local Multipoint Distribution Service), construction of new or modified stations may be initiated prior to grant of an authorization. As a condition to commencing construction under this paragraph (d), the Commission may, at any time and without hearing or notice, prohibit such construction for any reason. Any construction conducted under this paragraph is at the applicant's sole risk.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23164, Apr. 29, 1997; 63 FR 68981, Dec. 14, 1998; 68 FR 4955, Jan. 31, 2003]

§101.7 Eligibility for station license.

(a) A station license may not be granted to or held by a foreign government or by a representative of a foreign government.

(b) In the Common Carrier service, a station license may not be granted or held by:

(1) Any alien or the representative of any alien;

(2) Any corporation organized under the laws of any foreign government;

(3) Any corporation of which more than one-fifth of the capital stock is owned of record or voted by: Aliens or their representatives; a foreign government or representatives thereof; or any corporation organized under the laws of a foreign country; or

(4) Any corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens or their representatives, or by a foreign government or representative thereof, or by any corporation organized under the laws of a foreign government, if the Commission finds that the public interest will be served by the refusal or revocation of such license.

[61 FR 26677, May 28, 1996, as amended at 61 FR 55581, Oct. 28, 1996]

§101.17 Performance requirements for the 38.6-40.0 GHz frequency band.

(a) All 38.6-40.0 GHz band licensees must demonstrate substantial service at the time of license renewal. A licensee's substantial service showing should include, but not be limited to, the following information for each channel for which they hold a license, in each EA or portion of an EA covered by their license, in order to qualify for renewal of that license. The information provided will be judged by the Commission to determine whether the licensee is providing service which rises to the level of "substantial."

(1) A description of the 38.6-40.0 GHz band licensee's current service in terms of geographic coverage;

(2) A description of the 38.6-40.0 GHz band licensee's current service in terms of population served, as well as any additional service provided during the license term;

(3) A description of the 38.6-40.0 GHz band licensee's investments in its system(s) (type of facilities constructed and their operational status is required);

(b) Any 38.6-40.0 GHz band licensees adjudged not to be providing substantial service will not have their licenses renewed.

[65 FR 38327, June 20, 2000]

§101.21 Technical content of applications.

Applications, except FCC Form 175, must contain all technical information required by the application form and any additional information necessary to fully describe the proposed facilities and to demonstrate compliance with all technical requirements of the rules governing the radio service involved (see subparts C, F, G, I, J, and L of this part, as appropriate). The following paragraphs describe a number of technical requirements.

(a)-(d) [Reserved]

(e) Each application in the Private Operational Fixed Point-to-Point Microwave Service and the Common Carrier Fixed Point-to-Point Microwave Service must include the following information:

Applicant's name and address.

Transmitting station name.

Transmitting station coordinates.

Frequencies and polarizations to be added, changed or deleted.

Transmitting equipment, its stability, effective isotropic radiated power, emission designator, and type of modulation (digital).

Transmitting antenna(s), model, gain, and, if required, a radiation pattern provided or certified by the manufacturer.

Transmitting antenna center line height(s) above ground level and ground elevation above mean sea level.

Receiving station name.

Receiving station coordinates.

Receiving antenna(s), model, gain, and, if required, a radiation pattern provided or certified by the manufacturer.

Receiving antenna center line height(s) above ground level and ground elevation above mean sea level.

Path azimuth and distance.

NOTE: The position location of antenna sites shall be determined to an accuracy of no less than ±1 second in the horizontal dimensions (latitude and longitude) and ±1 meter in the vertical dimension (ground elevation) with respect to the National Spacial Reference System.

(f) All applicants for regular authorization must, before filing an application, major amendments to a pending application, or modifications to a license, prior coordinate the proposed frequency usage with existing users in the area and other applicants with previously filed applications in accordance with the procedures in §101.103. In those frequency bands shared with the communication-satellite service, an applicant for a new station, for new points of communication, for the initial frequency assignment in a shared band for which coordination has not been previously effected, or for authority to modify the emission or radiation characteristics of an existing station in a manner that may increase the likelihood of harmful interference, must ascertain in advance whether the station(s) involved lie within the great circle coordination distance contours of an existing Earth station or one for which an application has been accepted for filing, and must coordinate his proposal with each such Earth station operator or applicant. For each potential interference path, the applicant must perform the computations required to determine that the expected level of interference to or from the terrestrial station does not exceed the maximum permissible interference power level in accordance with the technical standards and requirements of §25.251 of this chapter. The Commission may, in the course of examining any application, require the submission of additional showings, complete with pertinent data and calculations in accordance with part 25 of this chapter, showing that harmful interference will not likely result from the proposed operation. (Technical characteristics of the Earth stations on file and coordination contour maps for those Earth stations will be kept on file for public inspection in the offices of the Commission's International Bureau in Washington, DC.)

(g) Each application in the Local Multipoint Distribution Service and 24 GHz Service must contain all technical information required by FCC Form 601 and any other applicable form or associated Public Notices and by any applicable rules in this part.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23164, Apr. 29, 1997; 63 FR 68981, Dec. 14, 1998; 65 FR 38327, June 20, 2000; 65 FR 59357, Oct. 5, 2000; 78 FR 25176, Apr. 29, 2013]

§101.23 Waiver of rules.

Waiver of these rules may be granted upon application or on the Commission's own motion in accordance with §1.925 of this chapter.

[63 FR 68981, Dec. 14, 1998]

§101.31 Temporary and conditional authorizations.

(a) *Operation at temporary locations.* (1) Authorizations may be issued upon proper application for rendition of temporary service to subscribers under the following conditions:

(i) When a fixed station, authorized to operate at temporary locations, is to remain at a single location for more than 6 months, an application for a station authorization designating that single location as the permanent location shall be filed at least 90 days prior to the expiration of the 6 month period;

(ii) The station shall be used only for rendition of communication service at a remote point where the provision of wire facilities is not practicable within the required time frame; and

(iii) The antenna structure height employed at any location shall not exceed the criteria set forth in §17.7 of this chapter unless, in each instance, authorization for use of a specific maximum antenna structure height for each location has been obtained from the Commission prior to erection of the antenna. See §101.125.

(2) Applications for authorizations to operate stations at temporary locations under the provisions of this section shall be made upon FCC Form 601. Blanket applications may be submitted for the required number of transmitters. An application for authority to operate a fixed station at temporary locations must specify the precise geographic area within which the operation will be confined. The area specified must be defined as a radius of operation about a specific coordinate (latitude/longitude), or as a county, or as a State. Exception to this specific requirement may be made for exceptionally large areas, such as the continental United States. Sufficient data must be submitted to show the need for the proposed area of operation.

(3) Operations in the 17.8-19.7 GHz band for any services and in the 17.7-17.8 GHz band for MVPD operations are prohibited in the areas defined in §1.924 of this chapter. Operations proposed in the areas defined in §1.924 of this chapter may not commence without prior specific notification to, and authorization from, the Commission.

(b) *Conditional authorization.* (1) An applicant for a new point-to-point microwave radio station(s) or a modification of an existing station(s) in the 952.95-956.15 and 956.55-959.75 MHz band segments; the 3700-4200, 5925-6425, 6525-6875, and 6875-7125 MHz bands; the 10.550-10.680, 10.700-11.700, 12.700-13.150, 13.200-13.250, 17.700-18.300, and 19.300-19.700 GHz bands; and the 21.800-22.000 and 23.000-23.200 GHz band segments (see §101.147(s)(8) for specific service usage) may operate the proposed station(s) during the pendency of its applications(s) upon the filing of a properly completed formal application(s) that complies with subpart B of this part, if the applicant certifies that the following conditions are satisfied:

(i) The frequency coordination procedures of §101.103 have been successfully completed;

(ii) The antenna structure(s) has been previously studied by the Federal Aviation Administration and determined to pose no hazard to aviation safety as required by subpart B of part 17 of this chapter; or the antenna or tower structure does not exceed 6.1 meters above ground level or above an existing

man-made structure (other than an antenna structure), if the antenna or tower has not been previously studied by the Federal Aviation Administration and cleared by the FCC;

(iii) The grant of the application(s) does not require a waiver of the Commission's rules:

(iv) The applicant has determined that the facility(ies) will not significantly affect the environment as defined in §1.1307 of this chapter;

(v) The station site does not lie within 56.3 kilometers of any international border, within areas identified in §§1.924(a) through (d) of this chapter unless the affected entity consents in writing to conditional operation or, if for any services on frequencies in the 17.8-19.7 GHz band and for MVPD operations in the 17.7-17.8 GHz band, within any of the areas identified in §1.924 of this chapter;

(vi) If operated on frequencies in the 10.6-10.68 GHz band, the station site does not lie within any of the following regions:

Name of region	**Dimensions = radius in kilometers**	**Center-point**
Kitt Peak, Arizona	60	N31-57-22; W111-36-42
Big Pine, California	60	N37-13-54; W118-16-34
Vandenburg AFB, California	75	N34-43-00; W120-34-00
Denver, Colorado	150	N39-43-00; W104-46-00
Washington, DC	150	N38-48-00; W76-52-00
Eglin AFB, Florida	50	N30-29-00; W86-32-00
Mauna Kea, Hawaii	60	N19-48-16; W155-27-29
North Liberty, Iowa	60	N41-46-17; W91-34-26
Maryland Point, Maryland	60	N38-22-26; W77-14-00
Hancock, New Hampshire	60	N42-56-01; W71-59-12
Los Alamos, New Mexico	60	N35-46-30; W106-14-42
Pie Town, New Mexico	60	N34-18-04; W108-07-07
Socorro, New Mexico	160	N34-04-43; W107-37-04
WSMR, New Mexico	75	N32-23-00; W106-29-00
Minot AFB, North Dakota	80	N48-15-00; W101-17-00
Arecibo, Puerto Rico	160	N18-20-37; W66-45-11
Fort Davis, Texas	60	N30-38-06; W103-56-39
St. Croix, Virgin Islands	60	N17-45-31; W64-35-03
Brewster, Washington	60	N48-07-53; W119-40-55
Green Bank, West Virginia	160	N38-25-59; W79-50-24

Note: Coordinates are referenced to North American Datum 1983 (NAD83).

(vii) With respect to the 21.8-22.1 GHz and 23.0-23.3 GHz band, the filed application(s) does not propose to operate on a frequency pair centered on other than 21.825/23.025 GHz, 21.875/23.075 GHz, 21.925/23.125 GHz, 21.975/23.175 GHz, 22.025/23.225 GHz or 22.075/23.275 GHz and does not propose to operate with an E.I.R.P. greater than 55 dBm. The center frequencies are shifted from the center frequencies listed above for certain bandwidths as follows: add 0.005 GHz for 20 MHz bandwidth channels, add 0.010 GHz for 30 megahertz bandwidth channels, and subtract 0.005 GHz for 40 MHz bandwidth channels. *See* specific channel listings in §101.147(s).

(viii) The filed application(s) is consistent with the proposal that was coordinated pursuant to §101.103.

(2) Conditional authority ceases immediately if the application(s) is returned by the Commission because it is not acceptable for filing.

(3) Conditional authorization does not prejudice any action the Commission may take on the subject application(s). Conditional authority is accepted with the express understanding that such authority may be modified or cancelled by the Commission at any time without hearing if, in the Commission's discretion, the need for such action arises. An applicant operating pursuant to this conditional authority assumes all risks associated with such operation, the termination or modification of the conditional authority, or the subsequent dismissal or denial of its applications(s).

[61 FR 26677, May 28, 1996, as amended at 62 FR 55538, Oct. 27, 1997; 63 FR 10779, Mar. 5, 1998; 63 FR 68981, Dec. 14, 1998; 65 FR 38327, June 20, 2000; 68 FR 4955, Jan. 31, 2003; 69 FR 17959, Apr. 6, 2004; 71 FR 69048, Nov. 29, 2006; 75 FR 41771, July 19, 2010; 76 FR 59571, Sept. 27, 2011; 80 FR 38912, July 7, 2015]

PROCESSING OF APPLICATIONS

§101.45 Mutually exclusive applications.

(a) The Commission will consider applications to be mutually exclusive if their conflicts are such that the grant of one application would effectively preclude by reason of harmful electrical interference, or other practical reason, the grant of one or more of the other applications. The Commission will presume “harmful electrical interference” exists when the levels of §101.105 are exceeded, or when there is a material impairment to service rendered to the public despite full cooperation in good faith by all applicants or parties to achieve reasonable technical adjustments which would avoid electrical conflict.

(b) A common carrier application, except in the Local Multipoint Distribution Service and in the 24 GHz Service, will be entitled to comparative consideration with one or more conflicting applications only if:

(1) The application is mutually exclusive with the other application; and

(2) The application is received by the Commission in a condition acceptable for filing by whichever “cut-off” date is earlier:

(i) Sixty (60) days after the date of the public notice listing the first of the conflicting applications as accepted for filing; or

(ii) One (1) business day preceding the day on which the Commission takes final action on the previously filed application (should the Commission act upon such application in the interval between thirty (30) and sixty (60) days after the date of its public notice).

(c) Whenever three or more applications are mutually exclusive, but not uniformly so, the earliest filed application established the date prescribed in paragraph (b)(2) of this section, regardless of whether or not subsequently filed applications are directly mutually exclusive with the first filed application. (For example, applications A, B, and C are filed in that order. A and B are directly mutually exclusive, B and C are directly mutually exclusive. In order to be considered comparatively with B, C must be filed within the “cut-off” period established by A even though C is not directly mutually exclusive with A.)

(d) Private operational fixed point-to-point microwave applications for authorization under this part will be entitled to comparative consideration with one or more conflicting applications in accordance with the provisions of §1.227(b)(4) of this chapter.

(e) An application otherwise mutually exclusive with one or more previously filed applications, but filed after the appropriate date prescribed in paragraphs (b) or (d) of this section, will be returned without prejudice and will be eligible for refiling only after final action is taken by the Commission with respect to the previously filed application (or applications).

(f) For purposes of this section, any application (whether mutually exclusive or not) will be considered to be a newly filed application if it is amended by a major amendment (as defined by §1.929 of this chapter), except under any of the following circumstances:

(1) The application has been designated for comparative hearing, or for comparative evaluation (pursuant to §101.51 of this part), and the Commission or the presiding officer accepts the amendment pursuant to §1.927 of this chapter;

(2) The amendment resolves frequency conflicts with authorized stations or other pending applications which would otherwise require resolution by hearing or by comparative evaluation pursuant to §101.51 provided that the amendment does not create new or additional frequency conflicts;

(3) The amendment reflects only a change in ownership or control found by the Commission to be in the public interest, and for which a requested exemption from the “cut-off” requirements of this section is granted;

(4) The amendment reflects only a change in ownership or control which results from an agreement under §1.935 of this chapter whereby two or more applicants entitled to comparative consideration of their applications join in one (or more) of the existing applications and request dismissal of their other application (or applications) to avoid the delay and cost of comparative consideration;

(5) The amendment corrects typographical, transcription, or similar clerical errors which are clearly demonstrated to be mistakes by reference to other parts of the application, and whose discovery does not create new or increased frequency conflicts; or

(6) The amendment does not create new or increased frequency conflicts, and is demonstrably necessitated by events which the applicant could not have reasonably foreseen at the time of filing, such as, for example:

(i) The loss of a transmitter or receiver site by condemnation, natural causes, or loss of lease or option;

(ii) Obstruction of a proposed transmission path caused by the erection of a new building or other structure; or

(iii) The discontinuance or substantial technological obsolescence of specified equipment, whenever the application has been pending before the Commission for two or more years from the date of its filing.

(g) Applicants for the 932.5-935/941.5-944 MHz bands shall select a frequency pair. Applicants for these bands may select an unpaired frequency only upon a showing that spectrum efficiency will not be impaired and that unpaired spectrum is not available in other bands. During the initial filing window, frequency coordination is not required, except that an application for a frequency in the 942-944 MHz band must be coordinated to ensure that it does not affect an existing broadcast auxiliary service licensee. After the initial filing window, an applicant must submit evidence that frequency coordination has been performed with all licensees affected by the application. All frequency coordination must be performed in accordance with §101.103. In the event of mutually exclusive applications occurring during the initial filing window for the 932.5-935/941.5-944 MHz bands, applicants shall be given the opportunity to resolve these situations by applying for an alternative frequency pair, if one is available. To the extent

that there are no other available frequencies or to the extent that mutually exclusive applications remain after this process is concluded, lotteries shall be conducted for each frequency pair among all remaining mutually exclusive applications, assuming appropriate coordination with existing broadcast auxiliary stations can be concluded, where necessary. In the event of mutually exclusive applications being received for these bands on the same day after the initial filing window has closed and a subsequent filing window opened, lotteries shall be conducted for each frequency pair among all mutually exclusive applications.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23164, Apr. 29, 1997; 62 FR 24582, May 6, 1997; 63 FR 6103, Feb. 6, 1998; 63 FR 68982, Dec. 14, 1998; 65 FR 59357, Oct. 5, 2000]

§101.51 Comparative evaluation of mutually exclusive applications.

(a) In order to expedite action on mutually exclusive applications in services under this rules part where neither competitive bidding nor the random selection processes apply, the applicants may request the Commission to consider their applications without a formal hearing in accordance with the summary procedure outlined in paragraph (b) in this section if:

(1) The applications are entitled to comparative consideration pursuant to §101.45;

(2) The applications have not been designated for formal evidentiary hearing; and

(3) The Commission determines, initially or at any time during the procedure outline in paragraph (b) of this section, that such procedure is appropriate, and that, from the information submitted and consideration of such other matters as may be officially noticed, there are no substantial and material questions of fact, presented (Other than those relating to the comparative merits of the applications) which would preclude a grant under §1.915 of this chapter.

(b) Provided that the conditions of paragraph (a) of this section are satisfied, applicants may request the Commission to act upon their mutually exclusive applications without a formal hearing pursuant to the summary procedure outlined below:

(1) To initiate the procedure, each applicant will submit to the Commission a written statement containing:

(i) A waiver of the applicant's right to a formal hearing;

(ii) A request and agreement that, in order to avoid the delay and expense of a comparative formal hearing, the Commission should exercise its judgment to select from among the mutually exclusive applications that proposal (or proposals) which would best serve the public interest; and

(iii) The signature of a principal (and the principal's attorney if represented).

(2) After receipt of the written requests of all of the applicants the Commission (if it deems this procedure appropriate) will issue a notice designating the comparative criteria upon which the applications are to be evaluated and will request each applicant to submit, within a specified period of time, additional information concerning the applicant's proposal relative to the comparative criteria.

(3) Within thirty (30) days following the due date for filing this information, the Commission will accept concise and factual argument on the competing proposals from the rival applicants, potential customers, and other knowledgeable parties in interest.

(4) Within fifteen (15) days following the due date for the filing of comments, the Commission will accept concise and factual replies from the rival applicants.

(5) From time to time during the course of this procedure the Commission may request additional information from the applicants and hold informal conferences at which all competing applicants will have the right to be represented.

(6) Upon evaluation of the applications, the information submitted, and such other matters as may be officially noticed the Commission will issue a decision granting one (or more) of the proposals which it concludes would best serve the public interest, convenience and necessity. The decision will report briefly and concisely the reasons for the Commission's selection and will deny the other application(s). This decision will be considered final.

[61 FR 26677, May 28, 1996, as amended at 63 FR 6104, Feb. 6, 1998; 63 FR 68982, Dec. 14, 1998]

LICENSE TRANSFERS, MODIFICATIONS, CONDITIONS AND FORFEITURES

§101.55 Considerations involving transfer or assignment applications.

(a) Except as provided for in paragraph (d) of this section, licenses not authorized pursuant to competitive bidding procedures may not be assigned or transferred prior to the completion of construction of the facility.

(b) [Reserved]

(c) At its discretion, the Commission may require the submission of an affirmative, factual showing (supported by affidavits of a person or persons with personal knowledge thereof) to demonstrate that the proposed assignor or transferor has not acquired an authorization or operated a station for the principal purpose of profitable sale rather than public service. This showing may include, for example, a demonstration that the proposed assignment or transfer is due to changed circumstances (described in detail) affecting the licensee subsequent to the acquisition of the license, or that the proposed transfer of radio facilities is incidental to a sale of other facilities or merger of interests.

(d) If a proposed transfer of radio facilities is incidental to a sale or other facilities or merger of interests, the showing specified under paragraph (c) of this section shall be submitted and include an additional exhibit that:

(1) Discloses complete details as to the sale of facilities or merger of interests;

(2) Segregates clearly by an itemized accounting, the amount of consideration involved in the sale of facilities or merger of interests; and

(3) Demonstrates that the amount of consideration assignable to the facilities or business interests involved represents their fair market value at the time of the transaction.

[61 FR 26677, May 28, 1996, as amended at 63 FR 6104, Feb. 6, 1998; 63 FR 68982, Dec. 14, 1998; 65 FR 38327, June 20, 2000; 68 FR 4955, Jan. 31, 2003]

§101.56 Partitioned service areas (PSAs) and disaggregated spectrum.

(a)(1) The holder of an EA authorization to provide service pursuant to the competitive bidding process and any incumbent licensee of rectangular service areas in the 38.6-40.0 GHz band may enter into agreements with eligible parties to partition any portion of its service area as defined by the

partitioner and partitionee. Alternatively, licensees may enter into agreements or contracts to disaggregate any portion of spectrum, provided acquired spectrum is disaggregated according to frequency pairs.

(2)(i) Contracts must be filed with the Commission within 30 days of the date that such agreements are reached.

(ii) The contracts must include descriptions of the areas being partitioned or spectrum disaggregated. The partitioned service area shall be defined by coordinate points at every 3 seconds along the partitioned service area unless an FCC recognized service area is utilized (i.e., Metropolitan Service Area or Rural Service Area) or county lines are followed. If geographic coordinate points are used, they must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83). In the case where an FCC recognized service area or county lines are utilized, applicants need only list the specific area(s) (through use of FCC designations or county names) that constitute the partitioned area.

(b) The eligibility requirements applicable to EA authorization holders also apply to those individuals and entities seeking partitioned or disaggregated spectrum authorizations.

(c) Subsequent to issuance of the authorization for a partitioned service area, the partitioned area will be treated as a separate protected service area.

(d)(1) When any area within an EA becomes a partitioned service area, the remaining counties and geopolitical subdivision within that EA will be subsequently treated and classified as a partitioned service area.

(2) At the time an EA is partitioned, the Commission shall cancel the EA authorization initially issued and issue a partitioned service area authorization to the former EA authorization holder.

(e) At the time a BTA is partitioned, the Commission shall cancel the BTA authorization initially issued and issue a partitioned service area authorization to the former BTA authorization holder.

(f) The duties and responsibilities imposed upon EA authorization holders in this part, apply to those licensees obtaining authorizations by partitioning or spectrum disaggregation.

(g) The build-out requirements for the partitioned service area or disaggregated spectrum shall be the same as applied to the EA authorization holder.

(h) The license term for the partitioned service area or disaggregated spectrum shall be the remainder of the period that would apply to the EA authorization holder.

(i) Licensees, including those using bidding credits in a competitive bidding procedure, shall have the authority to partition service areas or disaggregate spectrum.

[63 FR 6104, Feb. 6, 1998, as amended at 63 FR 68982, Dec. 14, 1998; 64 FR 45893, Aug. 23, 1999; 64 FR 59664, Nov. 3, 1999; 67 FR 45379, July 9, 2002]

EDITORIAL NOTE: At 64 FR 59664, Nov. 3, 1999, in §101.56, paragraphs (d)(1) and (2) were redesignated as (d) and (e); however, paragraph (e) already exists and the change could not be made.

§101.61 Certain modifications not requiring prior authorization in the Local Multipoint Distribution Service and 24 GHz Service

In the Local Multipoint Distribution Service (LMDS) licensees may add, remove, or relocate facilities within the area authorized by the license without prior authorization. Upon request by an incumbent licensee or the Commission, an LMDS licensee shall furnish the technical parameters, location and coordinates of the completion of the addition, removal, relocation or modification of any of its facilities within the BTA. The LMDS licensee must provide such information within ten (10) days of receiving a written request. This section also applies to 24 GHz licensees that are licensed according to Economic Areas.

[65 FR 59357, Oct. 5, 2000]

§101.63 Period of construction; certification of completion of construction.

(a) Each Station, except in Multichannel Video Distribution and Data Service, Local Multipoint Distribution Services, 24 GHz Service, and the 38.6-40.0 GHz band, authorized under this part must be in operation within 18 months from the initial date of grant.

(b) For the 70 GHz, 80 GHz, and 90 GHz bands, the 12-month construction period will commence on the date of each registration of each individual link; adding links will not change the overall renewal period of the license.

(c) Failure to timely begin operation means the authorization cancels automatically.

(d) The frequencies associated with all point-to-multipoint authorizations which have cancelled automatically or otherwise been recovered by the Commission will again be made available for reassignment on a date and under terms set forth by Public Notice. See §101.1331(d) for treatment of MAS incumbent site-by-site licenses recovered in EAs.

(e) Requests for extension of time may be granted upon a showing of good cause pursuant to §1.946(e) of this chapter.

(f) Construction of any authorized facility or frequency must be completed by the date specified in the license as pursuant to §1.946 of this chapter.

(g) MVPD licensees which have both analog and digital emissions designators specified on the license and which already have, or may transition from analog to digital operations, or a combination of both, meet their completion of construction requirements and do not automatically surrender their license provided they are using either set of emissions. If the licensee has completed the transition to digital, the license can remove the unused analog emission designators the next time a modification or renewal application is filed.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23165, Apr. 29, 1997; 63 FR 6104, Feb. 6, 1998; 63 FR 68982, Dec. 14, 1998; 64 FR 45893, Aug. 23, 1999; 65 FR 17448, Apr. 3, 2000; 65 FR 38327, June 20, 2000; 65 FR 59357, Oct. 5, 2000; 69 FR 3266, Jan. 23, 2004; 69 FR 16832, Mar. 31, 2004; 71 FR 69048, Nov. 29, 2006]

§101.64 Service areas.

Service areas for 38.6-40.0 GHz service are Economic Areas (EAs) as defined below. EAs are delineated by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce. The Commerce Department organizes the 50 States and the District of Columbia into 172 EAs. Additionally, there are four EA-like areas: Guam and Northern Mariana Islands; Puerto Rico and the U.S. Virgin Islands; American Samoa and the Gulf of Mexico. A total of 175 authorizations (excluding the Gulf of Mexico EA-like area) will be issued for each channel block in the 39 GHz band.

[64 FR 45893, Aug. 23, 1999]

§101.65 Forfeiture and termination of station authorizations.

(a) In addition to the provisions of §1.955 of this chapter, a license will be automatically forfeited in whole or in part without further notice to the licensee upon the voluntary removal or alteration of the facilities, so as to render the station not operational for a period of 30 days or more.

(b) Pursuant to §1.955 of this chapter, if a station licensed under this part discontinues operation on a permanent basis, the licensee must cancel the license. For purposes of this section, any station which has not operated for one year or more is considered to have been permanently discontinued. *See* §101.305 for additional rules regarding temporary and permanent discontinuation of service.

[63 FR 68983, Dec. 14, 1998]

§101.67 License period.

Licenses for stations authorized under this part will be issued for a period not to exceed 10 years. Unless otherwise specified by the Commission, the expiration of regular licenses shall be on the date (month and day) selected by licensees in the year of expiration.

POLICIES GOVERNING MICROWAVE RELOCATION FROM THE 1850-1990 AND 2110-2200 MHZ BANDS

§101.69 Transition of the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands from the fixed microwave services to personal communications services and emerging technologies.

Fixed Microwave Services (FMS) in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands have been allocated for use by emerging technology (ET) services, including Personal Communications Services (PCS), Advanced Wireless Services (AWS), and Mobile Satellite Services (MSS). The rules in this section provide for a transition period during which ET licensees may relocate existing FMS licensees using these frequencies to other media or other fixed channels, including those in other microwave bands.

(a) ET licensees may negotiate with FMS licensees authorized to use frequencies in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands, for the purpose of agreeing to terms under which the FMS licensees would:

(1) Relocate their operations to other fixed microwave bands or other media; or alternatively

(2) Accept a sharing arrangement with the ET licensee that may result in an otherwise impermissible level of interference to the FMS operations.

(b)-(c) [Reserved]

(d) Relocation of FMS licensees in the 2110-2150 and 2160-2200 MHz band will be subject to mandatory negotiations only. Except as provided in paragraph (e) of this section, mandatory negotiation periods are defined as follows:

(1) Non-public safety incumbents will have a two-year mandatory negotiation period; and

(2) Public safety incumbents will have a three-year mandatory negotiation period.

(e) Relocation of FMS licensees by Mobile-Satellite Service (MSS) licensees will be subject to mandatory negotiations only.

(1) The mandatory negotiation period for non-public safety incumbents will end December 8, 2004.

(2) The mandatory negotiation period for public safety incumbents will end December 8, 2005.

(f) AWS licensees operating in the 1910-1920 MHz and 2175-2180 MHz bands will follow the requirements and procedures set forth in ET Docket No. 00-258 and WT Docket No. 04-356.

(g) If no agreement is reached during the mandatory negotiation period, an ET licensee may initiate involuntary relocation procedures. Under involuntary relocation, the incumbent is required to relocate, provided that the ET licensee meets the conditions of §101.75.

[62 FR 12758, Mar. 18, 1997, as amended at 65 FR 48182, Aug. 7, 2000; 68 FR 3464, Jan. 24, 2003; 68 FR 68253, Dec. 8, 2003; 69 FR 62622, Oct. 27, 2004; 71 FR 29842, May 24, 2006; 78 FR 8271, Feb. 5, 2013; 78 FR 48621, Aug. 9, 2013]

§101.71 [Reserved]

§101.73 Mandatory negotiations.

(a) A mandatory negotiation period may be initiated at the option of the ET licensee. Relocation of FMS licensees by Mobile Satellite Service (MSS) operators and AWS licensees in the 2110-2150 MHz and 2160-2200 MHz bands will be subject to mandatory negotiations only.

(b) Once mandatory negotiations have begun, an FMS licensee may not refuse to negotiate and all parties are required to negotiate in good faith. Good faith requires each party to provide information to the other that is reasonably necessary to facilitate the relocation process. In evaluating claims that a party has not negotiated in good faith, the FCC will consider, *inter alia,* the following factors:

(1) Whether the ET licensee has made a *bona fide* offer to relocate the FMS licensee to comparable facilities in accordance with Section 101.75(b);

(2) If the FMS licensee has demanded a premium, the type of premium requested (*e.g.,* whether the premium is directly related to relocation, such as system-wide relocations and analog-to-digital conversions, versus other types of premiums), and whether the value of the premium as compared to the cost of providing comparable facilities is disproportionate (*i.e.,* whether there is a lack of proportion or relation between the two);

(3) What steps the parties have taken to determine the actual cost of relocation to comparable facilities;

(4) Whether either party has withheld information requested by the other party that is necessary to estimate relocation costs or to facilitate the relocation process.

(c) Any party alleging a violation of our good faith requirement must attach an independent estimate of the relocation costs in question to any documentation filed with the Commission in support of its claim. An independent cost estimate must include a specification for the comparable facility and a statement of the costs associated with providing that facility to the incumbent licensee.

(d) *Provisions for Relocation of Fixed Microwave Licensees in the 2110-2150 and 2160-2200 MHz bands.* A separate mandatory negotiation period will commence for each FMS licensee when an ET licensee informs that FMS licensee in writing of its desire to negotiate. Mandatory negotiations will be conducted with the goal of providing the FMS licensee with comparable facilities defined as facilities possessing the following characteristics:

(1) *Throughput.* Communications throughput is the amount of information transferred within a system in a given amount of time. If analog facilities are being replaced with analog, comparable facilities provide an equivalent number of 4 kHz voice channels. If digital facilities are being replaced with digital, comparable facilities provide equivalent data loading bits per second (bps).

(2) *Reliability.* System reliability is the degree to which information is transferred accurately within a system. Comparable facilities provide reliability equal to the overall reliability of the FMS system. For digital systems, reliability is measured by the percent of time the bit error rate (BER) exceeds a desired value, and for analog or digital voice transmission, it is measured by the percent of time that audio signal quality meets an established threshold. If an analog system is replaced with a digital system, only the resulting frequency response, harmonic distortion, signal-to-noise and its reliability will be considered in determining comparable reliability.

(3) *Operating Costs.* Operating costs are the cost to operate and maintain the FMS system. ET licensees would compensate FMS licensees for any increased recurring costs associated with the replacement facilities (*e.g.*, additional rental payments, and increased utility fees) for five years after relocation. ET licensees could satisfy this obligation by making a lump-sum payment based on present value using current interest rates. Additionally, the maintenance costs to the FMS licensee would be equivalent to the 2 GHz system in order for the replacement system to be comparable.

[61 FR 29694, June 12, 1996, as amended at 62 FR 12758, Mar. 18, 1997; 65 FR 48182, Aug. 7, 2000; 68 FR 3464, Jan. 24, 2003; 68 FR 68253, Dec. 8, 2003; 69 FR 62622, Oct. 27, 2004; 71 FR 29842, May 24, 2006; 78 FR 8272, Feb. 5, 2013; 78 FR 48621, Aug. 9, 2013]

§101.75 Involuntary relocation procedures.

(a) If no agreement is reached during the mandatory negotiation period, an ET licensee may initiate involuntary relocation procedures under the Commission's rules. ET licensees are obligated to pay to relocated only the specific microwave links to which their systems pose an interference problem. Under involuntary relocation, the FMS licensee is required to relocate, provided that the ET licensee:

(1) Guarantees payment of relocation costs, including all engineering, equipment, site and FCC fees, as well as any legitimate and prudent transaction expenses incurred by the FMS licensee that are directly attributable to an involuntary relocation, subject to a cap of two percent of the hard costs involved. Hard costs are defined as the actual costs associated with providing a replacement system, such as equipment and engineering expenses. ET licensees are not required to pay FMS licensees for internal resources devoted to the relocation process. ET licensees are not required to pay for transaction costs incurred by FMS licensees during the voluntary or mandatory periods once the involuntary period is initiated, or for fees that cannot be legitimately tied to the provision of comparable facilities;

(2) Completes all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedure and, if radio facilities are used, identifying and obtaining, on the incumbents' behalf, new microwave frequencies and frequency coordination; and

(3) Builds the replacement system and tests it for comparability with the existing 2 GHz system.

(b) *Comparable facilities.* The replacement system provided to an incumbent during an involuntary relocation must be at least equivalent to the existing FMS system with respect to the following three factors:

(1) *Throughput.* Communications throughput is the amount of information transferred within a system in a given amount of time. If analog facilities are being replaced with analog, the ET licensee is required to provide the FMS licensee with an equivalent number of 4 kHz voice channels. If digital facilities are being replaced with digital, the ET licensee must provide the FMS licensee with equivalent data loading bits per second (bps). ET licensees must provide FMS licensees with enough throughput to satisfy the FMS licensee's system use at the time of relocation, not match the total capacity of the FMS system.

(2) *Reliability.* System reliability is the degree to which information is transferred accurately within a system. ET licensees must provide FMS licensees with reliability equal to the overall reliability of their system. For digital data systems, reliability is measured by the percent of time the bit error rate (BER) exceeds a desired value, and for analog or digital voice transmissions, it is measured by the percent of time that audio signal quality meets an established threshold. If an analog voice system is replaced with a digital voice system, only the resulting frequency response, harmonic distortion, signal-to-noise ratio and its reliability will be considered in determining comparable reliability.

(3) *Operating costs.* Operating costs are the cost to operate and maintain the FMS system. ET licensees must compensate FMS licensees for any increased recurring costs associated with the replacement facilities (*e.g.,* additional rental payments, increased utility fees) for five years after relocation. ET licensees may satisfy this obligation by making a lump-sum payment based on present value using current interest rates. Additionally, the maintenance costs to the FMS licensee must be equivalent to the 2 GHz system in order for the replacement system to be considered comparable.

(c) The FMS licensee is not required to relocate until the alternative facilities are available to it for a reasonable time to make adjustments, determine comparability, and ensure a seamless handoff.

(d) *Twelve-month trial period.* If, within one year after the relocation to new facilities, the FMS licensee demonstrates that the new facilities are not comparable to the former facilities, the ET licensee must remedy the defects or pay to relocate the microwave licensee to one of the following: its former or equivalent 2 GHz channels, another comparable frequency band, a land-line system, or any other facility that satisfies the requirements specified in paragraph (b) of this section. This trial period commences on the date that the FMS licensee begins full operation of the replacement link. If the FMS licensee has retained its 2 GHz authorization during the trial period, it must return the license to the Commission at the end of the twelve months. FMS licensees relocated from the 2110-2150 and 2160-2200 MHz bands may not be returned to their former 2 GHz channels. All other remedies specified in paragraph (d) are available to FMS licensees relocated from the 2110-2150 MHz and 2160-2200 MHz bands, and may be invoked whenever the FMS licensee demonstrates that its replacement facility is not comparable, subject to no time limit.

[61 FR 29694, June 12, 1996, as amended at 65 FR 48183, Aug. 7, 2000; 68 FR 3464, Jan. 24, 2003; 71 FR 29842, May 24, 2006]

§101.77 Public safety licensees in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands.

(a) In order for public safety licensees to qualify for a three year mandatory negotiation period as defined in §101.69(d)(2), the department head responsible for system oversight must certify to the ET licensee requesting relocation that:

(1) The agency is a Police licensee, a Fire Licensee, or an Emergency Medical Licensee as defined in §90.7 of this chapter, or meets the eligibility requirements of §90.20(a)(2) of this chapter, except for §90.20(a)(2)(ii) of this chapter, or that it is a licensee of other part 101 facilities licensed on a primary basis under the eligibility requirements of part 90, subpart B of this chapter; and

(2) The majority of communications carried on the facilities at issue involve safety of life and property.

(b) A public safety licensee must provide certification within thirty (30) days of a request from a ET licensee, or the ET licensee may presume that special treatment is inapplicable. If a public safety licensee falsely certifies to an ET licensee that it qualifies for the extended time periods, this licensee will be in violation of the Commission's rules and will subject to appropriate penalties, as well as immediately subject to the non-public safety time periods.

[61 FR 29695, June 12, 1996, as amended at 62 FR 12758, Mar. 18, 1997; 62 FR 18936, Apr. 17, 1997; 71 FR 29842, May 24, 2006]

§101.79 Sunset provisions for licensees in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands.

(a) FMS licensees will maintain primary status in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands unless and until an ET licensee requires use of the spectrum. ET licensees are not required to pay relocation costs after the relocation rules sunset. Once the relocation rules sunset, an ET licensee may require the incumbent to cease operations, provided that the ET licensee intends to turn on a system within interference range of the incumbent, as determined by TIA TSB 10-F (for terrestrial-to-terrestrial situations) or TIA TSB 86 (for MSS satellite-to-terrestrial situations) or any standard successor. ET licensee notification to the affected FMS licensee must be in writing and must provide the incumbent with no less than six months to vacate the spectrum. After the six-month notice period has expired, the FMS licensee must turn its license back into the Commission, unless the parties have entered into an agreement which allows the FMS licensee to continue to operate on a mutually agreed upon basis. The date that the relocation rules sunset is determined as follows:

(1) For the 2110-2150 MHz and 2160-2175 MHz and 2175-2180 MHz bands, ten years after the first ET license is issued in the respective band; and

(2) For the 2180-2200 MHz band, for MSS/ATC December 8, 2013 (*i.e.,* ten years after the mandatory negotiation period begins for MSS/ATC operators in the service), and for ET licensees authorized under part 27 ten years after the first part 27 license is issued in the band. To the extent that an MSS operator is also an ET licensee authorized under part 27, the part 27 sunset applies to its relocation and cost sharing obligations should the two sets of obligations conflict.

(b) If the parties cannot agree on a schedule or an alternative arrangement, requests for extension will be accepted and reviewed on a case-by-case basis. The Commission will grant such extensions only if the incumbent can demonstrate that:

(1) It cannot relocate within the six-month period (*e.g.,* because no alternative spectrum or other reasonable option is available), and;

(2) The public interest would be harmed if the incumbent is forced to terminate operations (*e.g.,* if public safety communications services would be disrupted).

[61 FR 29695, June 12, 1996, as amended at 62 FR 12758, Mar. 18, 1997; 68 FR 68254, Dec. 8, 2003; 71 FR 29842, May 24, 2006; 78 FR 8272, Feb. 5, 2013]

§101.81 Future licensing in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands.

After April 25, 1996, all major modifications and extensions to existing FMS systems in the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands will be authorized on a secondary basis to ET systems. All other modifications will render the modified FMS license secondary to ET operations, unless the incumbent affirmatively justifies primary status and the incumbent FMS licensee establishes that the modification would not add to the relocation costs of ET licensees. Incumbent FMS licensees will maintain primary status for the following technical changes:

(a) Decreases in power;

(b) Minor changes (increases or decreases) in antenna height;

(c) Minor location changes (up to two seconds);

(d) Any data correction which does not involve a change in the location of an existing facility;

(e) Reductions in authorized bandwidth;

(f) Minor changes (increases or decreases) in structure height;

(g) Changes (increases or decreases) in ground elevation that do not affect centerline height;

(h) Minor equipment changes.

[61 FR 29695, June 12, 1996, as amended at 62 FR 12759, Mar. 18, 1997; 65 FR 38327, June 20, 2000]

§101.82 Reimbursement and relocation expenses in the 2110-2150 MHz and 2160-2200 MHz bands.

(a) Reimbursement and relocation expenses for the 2110-2130 MHz and 2160-2200 MHz bands are addressed in §§27.1160-27.1174.

(b) *Cost-sharing obligations between AWS and MSS (space-to-Earth downlink).* Whenever an ET licensee (AWS or Mobile Satellite Service for space-to-Earth downlink in the 2130-2150 or 2180-2200 MHz bands) relocates an incumbent paired microwave link with one path in the 2130-2150 MHz band and the paired path in the 2180-2200 MHz band, the relocator is entitled to reimbursement of 50 percent of its relocation costs (see paragraph (e)) of this section from any other AWS licensee or MSS space-to-Earth downlink operator which would have been required to relocate the same fixed microwave link as set forth in paragraphs (c) and (d) of this section.

(c) *Cost-sharing obligations for MSS (space-to-Earth downlinks).* For an MSS space-to-Earth downlink, the cost-sharing obligation is based on the interference criteria for relocation, *i.e.*, TIA TSB 86 or any standard successor, relative to the relocated microwave link. Subsequently entering MSS space-to-Earth downlink operators must reimburse AWS or MSS space-to-Earth relocators (see paragraph (e)) of this section before the later entrant may begin operations in these bands, unless the later entrant can demonstrate that it would not have interfered with the microwave link in question.

(d) *Cost-sharing obligations among terrestrial stations.* For terrestrial stations (AWS), cost-sharing obligations are governed by §§27.1160 through 27.1174 of this chapter; provided, however, that MSS operators are not obligated to reimburse voluntarily relocating FMS incumbents in the 2180-2200 MHz

band. (AWS reimbursement and cost-sharing obligations relative to voluntarily relocating FMS incumbents are governed by §27.1166 of this chapter).

(e) The total costs of which 50 percent is to be reimbursed will not exceed $250,000 per paired fixed microwave link relocated, with an additional $150,000 permitted if a new or modified tower is required.

[71 FR 29843, May 24, 2006, as amended at 78 FR 8272, Feb. 5, 2013]

POLICIES GOVERNING FIXED SERVICE RELOCATION FROM THE 18.58-19.30 GHZ BAND

SOURCE: 65 FR 54173, Sept. 7, 2000, unless otherwise noted.

§101.83 Modification of station license.

Permissible changes in equipment operating in the band 18.3-19.3 GHz: Notwithstanding other provisions of this section, stations that remain co-primary under the provisions of §101.147(r) may not make modifications to their systems that increase interference to satellite earth stations, or result in a facility that would be more costly to relocate.

[68 FR 16968, Apr. 8, 2003]

§101.85 Transition of the 18.3-19.3 GHz band from the terrestrial fixed services to the fixed-satellite service (FSS).

Fixed services (FS) frequencies in the 18.3-19.3 GHz bands listed in §§21.901(e), 74.502(c), 74.602(g), and 78.18(a)(4) and §101.147(a) and (r) of this chapter have been allocated for use by the fixed-satellite service (FSS). The rules in this section provide for a transition period during which FSS licensees may relocate existing FS licensees using these frequencies to other frequency bands, media or facilities.

(a) FSS licensees may negotiate with FS licensees authorized to use frequencies in the 18.3-19.30 GHz bands for the purpose of agreeing to terms under which the FS licensees would:

(1) Relocate their operations to other frequency bands, media or facilities; or alternatively

(2) Accept a sharing arrangement with the FSS licensee that may result in an otherwise impermissible level of interference to the FSS operations.

(b)(1) FS operations in the 18.3-18.58 GHz band that remain co-primary under the provisions of §§21.901(e), 74.502(c), 74.602(d), 78.18(a)(4) and 101.147(r) of this chapter will continue to be co-primary with the FSS users of this spectrum until November 19, 2012 or until the relocation of the fixed service operations, whichever occurs sooner.

(2) FS operations in the 18.58-19.3 GHz band that remain co-primary under the provisions of §§21.901(e), 74.502(c), 74.602(d), 78.18(a)(4) and 101.147(r) of this chapter will continue to be co-primary with the FSS users of this spectrum until June 8, 2010 or until the relocation of the fixed service operations, whichever occurs sooner, except for operations in the band 19.26-19.3 GHz and low power systems operating pursuant to §101.47(r)(10), which shall operate on a co-primary basis until October 31, 2011.

(3) If no agreement is reached during the negotiations pursuant to §101.85(a), an FSS licensee may initiate relocation procedures. Under the relocation procedures, the incumbent is required to relocate, provided that the FSS licensee meets the conditions of §101.91.

(c) Negotiation periods are defined as follows:

(1) Non-public safety incumbents will have a two-year negotiation period.

(2) Public safety incumbents will have a three-year negotiation period.

[65 FR 54173, Sept. 7, 2000, as amended at 66 FR 63516, Dec. 7, 2001; 68 FR 16968, Apr. 8, 2003]

§101.89 Negotiations.

(a) The negotiation is triggered by the fixed-satellite service (FSS) licensee, who must contact the fixed services (FS) licensee and request that negotiations begin.

(b) Once negotiations have begun, an FS licensee may not refuse to negotiate and all parties are required to negotiate in good faith. Good faith requires each party to provide information to the other that is reasonably necessary to facilitate the relocation process. In evaluating claims that a party has not negotiated in good faith, the FCC will consider, inter alia, the following factors:

(1) Whether the FSS licensee has made a bona fide offer to relocate the FS licensee to comparable facilities in accordance with §101.91(b);

(2) If the FS licensee has demanded a premium, the type of premium requested (e.g., whether the premium is directly related to relocation, such as system-wide relocations and analog-to-digital conversions, versus other types of premiums), and whether the value of the premium as compared to the cost of providing comparable facilities is disproportionate (i.e., whether there is a lack of proportion or relation between the two);

(3) What steps the parties have taken to determine the actual cost of relocation to comparable facilities;

(4) Whether either party has withheld information requested by the other party that is necessary to estimate relocation costs or to facilitate the relocation process.

(c) Any party alleging a violation of our good faith requirement must attach an independent estimate of the relocation costs in question to any documentation filed with the Commission in support of its claim. An independent cost estimate must include a specification for the comparable facility and a statement of the costs associated with providing that facility to the incumbent licensee.

(d) Negotiations will commence when the FSS licensee informs the FS licensee in writing of its desire to negotiate. Negotiations will be conducted with the goal of providing the FS licensee with comparable facilities, defined as facilities possessing the following characteristics:

(1) *Throughput.* Communications throughput is the amount of information transferred within a system in a given amount of time. If analog facilities are being replaced with analog, the FSS licensee is required to provide the FS licensee with an equivalent number of 4 kHz voice channels. If digital facilities are being replaced with digital, the FSS licensee must provide the FS licensee with equivalent data loading bits per second (bps). FSS licensees must provide FS licensees with enough throughput to

satisfy the FS licensee's system use at the time of relocation, not match the total capacity of the FS system.

(2) *Reliability.* System reliability is the degree to which information is transferred accurately within a system. FSS licensees must provide FS licensees with reliability equal to the overall reliability of their system. For digital data systems, reliability is measured by the percent of time the bit error rate (BER) exceeds a desired value, and for analog or digital voice transmissions, it is measured by the percent of time that audio signal quality meets an established threshold. If an analog voice system is replaced with a digital voice system, only the resulting frequency response, harmonic distortion, signal-to-noise ratio and its reliability will be considered in determining comparable reliability.

(3) *Operating costs.* Operating costs are the cost to operate and maintain the FS system. FSS licensees must compensate FS licensees for any increased recurring costs associated with the replacement facilities (e.g., additional rental payments, increased utility fees) for five years after relocation. FSS licensees may satisfy this obligation by making a lump-sum payment based on present value using current interest rates. Additionally, the maintenance costs to the FS licensee must be equivalent to the 18 GHz system in order for the replacement system to be considered comparable.

§101.91 Involuntary relocation procedures.

(a) If no agreement is reached during the negotiations period, an FSS licensee may initiate relocation procedures under the Commission's rules. FSS licensees are obligated to pay to relocate only the specific microwave links from which their systems may receive interference. Under these procedures, the FS licensee is required to relocate, provided that the FSS licensee:

(1) Guarantees payment of relocation costs, including all engineering, equipment, site and FCC fees, as well as any legitimate and prudent transaction expenses incurred by the FS licensee that are directly attributable to the relocation, subject to a cap of two percent of the hard costs involved. Hard costs are defined as the actual costs associated with providing a replacement system, such as equipment and engineering expenses. FSS licensees are not required to pay FS licensees for internal resources devoted to the relocation process. FSS licensees are not required to pay for transaction costs incurred by FS licensees during the negotiations once the negotiation is initiated, or for fees that cannot be legitimately tied to the provision of comparable facilities;

(2) Completes all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedure and, if radio facilities are used, identifying and obtaining, on the incumbents' behalf, new microwave frequencies and frequency coordination; and

(3) Builds the replacement system and tests it for comparability with the existing 18 GHz system.

(b) *Comparable facilities.* The replacement system provided to an incumbent during a relocation must be at least equivalent to the existing FS system with respect to the following three factors:

(1) *Throughput.* Communications throughput is the amount of information transferred within a system in a given amount of time. If analog facilities are being replaced with analog, the FSS licensee is required to provide the FS licensee with an equivalent number of 4 kHz voice channels. If digital facilities are being replaced with digital, the FSS licensee must provide the FS licensee with equivalent data loading bits per second (bps). FSS licensees must provide FS licensees with enough throughput to satisfy the FS licensee's system use at the time of relocation, not match the total capacity of the FS system.

(2) *Reliability.* System reliability is the degree to which information is transferred accurately within a system. FSS licensees must provide FS licensees with reliability equal to the overall reliability of their system. For digital data systems, reliability is measured by the percent of time the bit error rate (BER)

exceeds a desired value, and for analog or digital voice transmissions, it is measured by the percent of time that audio signal quality meets an established threshold. If an analog voice system is replaced with a digital voice system, only the resulting frequency response, harmonic distortion, signal-to-noise ratio and its reliability will be considered in determining comparable reliability.

(3) *Operating costs.* Operating costs are the cost to operate and maintain the FS system. FSS licensees must compensate FS licensees for any increased recurring costs associated with the replacement facilities (e.g., additional rental payments, increased utility fees) for five years after relocation. FSS licensees may satisfy this obligation by making a lump-sum payment based on present value using current interest rates. Additionally, the maintenance costs to the FS licensee must be equivalent to the 18 GHz system in order for the replacement system to be considered comparable.

(c) The FS licensee is not required to relocate until the alternative facilities are available to it for a reasonable time to make adjustments, determine comparability, and ensure a seamless handoff. The FS licensee may take up to 12 months to make such adjustments and perform such testing.

(d) If the FS licensee demonstrates to the Commission that the new facilities are not comparable to the former facilities, the Commission may require the FSS licensee to further modify or replace the FS licensee's equipment.

[65 FR 54173, Sept. 7, 2000, as amended at 66 FR 63516, Dec. 7, 2001]

§101.95 Sunset provisions for licensees in the 18.30-19.30 GHz band.

(a) FSS licensees are not required to pay relocation costs after the relocation rules sunset (see §§74.502(c), 74.602(g), and 78.18(a)(4) of this chapter, and 101.147 (a) and (r)). Once the relocation rules sunset, an FSS licensee may require the incumbent to cease operations, provided that the FSS licensee intends to turn on a system within interference range of the incumbent, as determined by TIA Bulletin 10-F or any standard successor. FSS licensee notification to the affected FS licensee must be in writing and must provide the incumbent with no less than six months to vacate the spectrum. After the six-month notice period has expired, the FS licensee must turn its license back into the Commission, unless the parties have entered into an agreement which allows the FS licensee to continue to operate on a mutually agreed upon basis.

(b) If the parties cannot agree on a schedule or an alternative arrangement, requests for extension will be accepted and reviewed on a case-by-case basis. The Commission will grant such extensions only if the incumbent can demonstrate that:

(1) It cannot relocate within the six-month period (e.g., because no alternative spectrum or other reasonable option is available); and

(2) The public interest would be harmed if the incumbent is forced to terminate operations (e.g., if public safety communications services would be disrupted).

§101.97 Future licensing in the 18.30-19.30 GHz band.

(a) All major modifications and extensions to existing FS systems in the 18.3-18.58 band after November 19, 2002, or in the 18.58-19.30 band after June 8, 2000 (with the exception of certain low power operations authorized under §101.147(r)(10)) will be authorized on a secondary basis to FSS systems. All other modifications will render the modified FS license secondary to FSS operations, unless the incumbent affirmatively justifies primary status and the incumbent FS licensee establishes that the modification would not add to the relocation costs for FSS licensees. Incumbent FS licensees will maintain primary status for the following technical changes:

(1) Decreases in power;

(2) Minor changes (increases or decreases) in antenna height;

(3) Minor location changes (up to two seconds);

(4) Any data correction which does not involve a change in the location of an existing facility;

(5) Reductions in authorized bandwidth;

(6) Minor changes (increases or decreases) in structure height;

(7) Changes (increases or decreases) in ground elevation that do not affect centerline height;

(8) Minor equipment changes.

(9) Changes in ownership or control.

(b) The provisions of §101.83 are applicable, notwithstanding any other provisions of this section.

[65 FR 54173, Sept. 7, 2000, as amended at 66 FR 63516, Dec. 7, 2001; 68 FR 19698, Apr. 8, 2003]

Subpart C—Technical Standards

§101.101 Frequency availability.

Frequency band (MHz)	Radio service				
	Common carrier (Part 101)	**Private radio (Part 101)**	**Broadcast auxiliary (Part 74)**	**Other (Parts 15, 21, 22, 24, 25, 30, 74, 78 & 100)**	**Notes**
928-929	MAS	MAS		PRS	
932.0-932.5	MAS	MAS		PRS	
932.5-935.0	CC	OFS			(1).
941.0-941.5	MAS	MAS		PRS	
941.5-944.0	CC	OFS	Aural BAS		(1).
952-958		OFS/MAS		PRS	
958-960	MAS	OFS			
1850-1990		OFS		PCS	
2110-2130	CC			PET	
2130-2150		OFS		PET	
2160-2180	CC			ET	
2180-2200		OFS		PET	
2450-2500	CC	OFS	TV BAS	ISM	F/M/TF
2650-2690		OFS		MDS/ITFS	
3700-4200	CC LTTS	OFS		SAT	
5925-6425	CC LTTS	OFS		SAT	
6425-6525	LTTS	OFS	TV BAS	CARS	M.
6525-6875	CC	OFS			
6875-7125	CC	OFS	TV BAS	CARS	
10,550-10,680	CC	OFS DEMS			
10,700-11,700	CC	OFS		SAT	
12,200-12,700	~~MVDDS~~CC	~~MVDDS,~~		DBS, ~~NGSO FSS~~LMFUS	

		POFS			
12,700-13,250	CC LTTS	OFS	TV BAS	CARS	F/M/TF.
17,700-18,580	CC	OFS	TV BAS	SAT CARS	
17,700-18,300	CC	OFS	TV BAS	CARS	
18,300-18,580	CC	OFS	TV BAS	CARS SAT	
18,580-18,820	CC	OFS	Aural BAS	SAT	
18,820-18,920	CC	OFS		SAT	
18,920-19,160	CC	OFS	Aural BAS	SAT	
19,160-19,260	CC	OFS		SAT	
19,260-19,700	CC	OFS	TV BAS	CARS SAT	
21,200-23,600	CC LTTS	OFS			TF.
24,250-25,250	CC	OFS			
27,500-28,350	LMDS	LMDS			
29,100-29,250	LMDS	LMDS		SAT	
31,000-31,300	CC LMDS LTTS	OFS LMDS			F/M/TF.
38,600-40,000	CC	OFS	TV BAS		F/M/TF
71,000-76,000	CC	OFS		25	F/M/TF
81,000-86,000	CC	OFS		25	F/M/TF
92,000-95,000	CC	OFS		15	F/M/TF.

BAS: Broadcast Auxiliary Service—(Part 74)

CARS: Cable Television Relay Service—(Part 78)

CC: Common Carrier Fixed Point-to-Point Microwave Service—(Part 101, Subparts C & I)

DBS: Direct Broadcast Satellite—(Part 100)

DEMS: Digital Electronic Message Service—(Part 101, Subpart G)

ISM: Industrial, Scientific & Medical—(Part 18)

ITFS: Instructional Television Fixed Service—(Part 74)

LMFUS: Lower Microwave Flexible Use Service—(Part 30)

LTTS: Local Television Transmission Service—(Part 101, Subpart J)

MAS: Multiple Address System—(Part 101)

MDS: Multipoint Distribution Service—(Part 21)

OFS: Private Operational Fixed Point-to-Point Microwave Service—(Part 101, Subparts C & H)

PCS: Personal Communications Service—(Part 24)

PET: Emerging Technologies (per ET Dkt. No. 92-9, not yet assigned)

PRS: Paging and Radiotelephone Service—(Part 22, Subpart E)

SAT: Fixed Satellite Service—(Part 25)

Notes:

F—Fixed

M—Mobile

TF—Temporary Fixed

(1)—Applications for frequencies in the 932.5-935/941.5-944 MHz bands may be filed initially during a one-week period to be announced by public notice. After these applications have been processed, the Commission will announce by public notice a filing date for remaining frequencies. From this filing date forward, applications will be processed on a daily first-come, first-served basis.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23165, Apr. 29, 1997; 62 FR 24582, May 6, 1997; 65 FR 38327, June 20, 2000; 65 FR 54175, Sept. 7, 2000; 65 FR 59357, Oct. 5, 2000; 67 FR 43037, June 28, 2002; 69 FR 3266, Jan. 23, 2004; 69 FR 72047, Dec. 10, 2004; 70 FR 4787, Jan. 31, 2005; 76 FR 59571, Sept. 27, 2011]

§101.103 Frequency coordination procedures.

(a) Assignment of frequencies will be made only in such a manner as to facilitate the rendition of communication service on an interference-free basis in each service area. Unless otherwise indicated, each frequency available for use by stations in these services will be assigned exclusively to a single applicant in any service area. All applicants for, and licensees of, stations in these services must cooperate in the selection and use of the frequencies assigned in order to minimize interference and thereby obtain the most effective use of the authorized facilities. In the event harmful interference occurs or appears likely to occur between two or more radio systems and such interference cannot be resolved between the licensees thereof, the Commission may specify a time sharing arrangement for the stations involved or may, after notice and opportunity for hearing, require the licensees to make such changes in operating techniques or equipment as it may deem necessary to avoid such interference.

(b)(1) Operations in the bands 31,000-31,075 MHz and 31,225-31,300 MHz licensed prior to March 11, 1997, were licensed on an unprotected basis and are subject to harmful interference from similarly licensed operations in that band.

(i) Operations licensed in the Local Mulitpoint Distribution Service and those operations licensed prior to March 11, 1997, except in the Local Television Transmission Service, operating in these bands are equally protected against harmful interference from each other.

(ii) In the case of operations licensed prior to March 11, 1997, except in the Local Television Transmission Service, that are licensed on a point-to-radius basis, LMDS licensees shall be subject to the protection requirement established in this section in the case of existing links operated by such licensees, and in the case of links added by such licensees in the future in accordance with the terms of their point-to-radius licenses.

(iii) An LMDS licensee may not initiate operations within the point-to-radius area licensed to an operator (other than an operator in the Local Television Transmission Service) prior to March 11, 1997, even if such operator has not initiated operations to the fullest extent of the license. An LMDS licensee, however, may initiate operations at the border of such operator's license area without prior coordination if the LMDS licensee's operations would not cause harmful interference to the other operator's existing operations.

(iv) An operator (other than an operator in the Local Television Transmission Service) licensed on a point-to-radius basis prior to March 11, 1997, may add additional stations within its license area. Such operator shall coordinate with any affected LMDS licensee if its new operations might cause harmful interference to the existing operations of such LMDS licensee.

(v) Operations licensed prior to March 11, 1997, on a point-to-point basis may not be extended or otherwise modified through the addition of point-to-point links. Such operations shall be limited to the use of frequency pairs licensed as of March 11, 1997. Operations licensed in the Local Television Transmission Service as of March 11, 1997, may continue to operate, but such operators may not expand existing operations nor initiate new operations.

(2) Operations in the 31,075-31,225 MHz band licensed prior to March 11, 1997, shall receive no protection against harmful interference from authorized operations in the Local Multipoint Distribution Service in that band.

(3) Non-LMDS operations in the entire 31,000-31,300 MHz band licensed after March 11, 1997, based on applications refiled no later than June 26, 1998 are unprotected with respect to each other and subject to harmful interference from each other.

(i) Such operations and any operations licensed prior to March 11, 1997, in the band are unprotected with respect to each other and subject to harmful interference from each other.

(ii) Such operations are licensed on a secondary basis to LMDS operations licensed in the band, may not cause interference to LMDS operations, and are not protected from interference from LMDS operations.

(iii) Such operations licensed on a point-to-point basis may not be extended or otherwise modified through the addition of point-to-point links. Such operations licensed on a point-to-radius basis may add additional stations within the licensed area.

(c) Frequency diversity transmission will not be authorized in these services in the absence of a factual showing that the required communications cannot practically be achieved by other means. Where frequency diversity is deemed to be justified on a protection channel basis, it will be limited to one protection channel for the bands 3,700-4,200, 5925-6425, and 6525-6875 MHz, and a ratio of one protection channel for three working channels for the bands 10,550-10,680 and 10,700-11,700 MHz. In the bands 3,700-4,200, 5,925-6,425, and 6525-6875 MHz, no frequency diversity protection channel will be authorized unless there is a minimum of three working channels, except that where a substantial showing is made that a total of three working channels will be required within three years, a protection channel may be authorized simultaneously with the first working channel. A protection channel authorized under such exception will be subject to termination if applications for the third working channel are not filed within three years of the grant date of the applications for the first working channel. Where equipment employing digital modulation techniques with cross-polarized operation on the same frequency is used, the protection channel authorized under the above conditions may be considered to consist of both polarizations of the protection frequency where such is shown to be necessary.

(d) *Frequency coordination.* For each frequency authorized under this part, the following frequency usage coordination procedures will apply:

(1) *General requirements.* Proposed frequency usage must be prior coordinated with existing licensees, permittees and applicants in the area, and other applicants with previously filed applications, whose facilities could affect or be affected by the new proposal in terms of frequency interference on active channels, applied-for channels, or channels coordinated for future growth. Coordination must be completed prior to filing an application for regular authorization, or a major amendment to a pending application, or any major modification to a license. In coordinating frequency usage with stations in the

fixed satellite service, applicants must also comply with the requirements of §101.21(f). In engineering a system or modification thereto, the applicant must, by appropriate studies and analyses, select sites, transmitters, antennas and frequencies that will avoid interference in excess of permissible levels to other users. All applicants and licensees must cooperate fully and make reasonable efforts to resolve technical problems and conflicts that may inhibit the most effective and efficient use of the radio spectrum; however, the party being coordinated with is not obligated to suggest changes or re-engineer a proposal in cases involving conflicts. Applicants should make every reasonable effort to avoid blocking the growth of systems as prior coordinated. The applicant must identify in the application all entities with which the technical proposal was coordinated. In the event that technical problems are not resolved, an explanation must be submitted with the application. Where technical problems are resolved by an agreement or operating arrangement between the parties that would require special procedures be taken to reduce the likelihood of interference in excess of permissible levels (such as the use of artificial site shielding) or would result in a reduction of quality or capacity of either system, the details thereof may be contained in the application.

(2) Coordination procedure guidelines are as follows:

(i) Coordination involves two separate elements: notification and response. Both or either may be oral or in written form. To be acceptable for filing, all applications and major technical amendments must certify that coordination, including response, has been completed. The names of the licensees, permittees and applicants with which coordination was accomplished must be specified. If such notice and/or response is oral, the party providing such notice or response must supply written documentation of the communication upon request;

(ii) Notification must include relevant technical details of the proposal. At minimum, this should include, as applicable, the following:

Applicant's name and address.

Transmitting station name.

Transmitting station coordinates.

Frequencies and polarizations to be added, changed or deleted.

Transmitting equipment type, its stability, actual output power, emission designator, and type of modulation(s) (loading). Notification shall indicate if modulations lower than the values listed in the table to §101.141(a)(3) of the Commission's rules will be used.

Transmitting antenna type(s), model, gain and, if required, a radiation pattern provided or certified by the manufacturer.

Transmitting antenna center line height(s) above ground level and ground elevation above mean sea level.

Receiving station name.

Receiving station coordinates.

Receiving antenna type(s), model, gain, and, if required, a radiation pattern provided or certified by the manufacturer.

Receiving antenna center line height(s) above ground level and ground elevation above mean sea level.

Path azimuth and distance.

Estimated transmitter transmission line loss expressed in dB.

Estimated receiver transmission line loss expressed in dB.

For a system utilizing ATPC, maximum transmit power, coordinated transmit power, and nominal transmit power.

NOTE: The position location of antenna sites shall be determined to an accuracy of no less than ±1 second in the horizontal dimensions (latitude and longitude) and ±1 meter in the vertical dimension (ground elevation) with respect to the National Spatial Reference System.

(iii) For transmitters employing digital modulation techniques, the notification should clearly identify the type of modulation. Upon request, additional details of the operating characteristics of the equipment must also be furnished;

(iv) Response to notification should be made as quickly as possible, even if no technical problems are anticipated. Any response to notification indicating potential interference must specify the technical details and must be provided to the applicant, in writing, within the 30-day notification period. Every reasonable effort should be made by all applicants, permittees and licensees to eliminate all problems and conflicts. If no response to notification is received within 30 days, the applicant will be deemed to have made reasonable efforts to coordinate and may file its application without a response;

(v) The 30-day notification period is calculated from the date of receipt by the applicant, permittee, or licensee being notified. If notification is by mail, this date may be ascertained by:

(A) The return receipt on certified mail;

(B) The enclosure of a card to be dated and returned by the recipient; or

(C) A conservative estimate of the time required for the mail to reach its destination. In the last case, the estimated date when the 30-day period would expire should be stated in the notification.

(vi) An expedited prior coordination period (less than 30 days) may be requested when deemed necessary by a notifying party. The coordination notice should be identified as “expedited” and the requested response date should be clearly indicated. However, circumstances preventing a timely response from the receiving party should be accommodated accordingly. It is the responsibility of the notifying party to receive written concurrence (or verbal, with written to follow) from affected parties or their coordination representatives.

(vii) All technical problems that come to light during coordination must be resolved unless a statement is included with the application to the effect that the applicant is unable or unwilling to resolve the conflict and briefly the reason therefor;

(viii) Where a number of technical changes become necessary for a system during the course of coordination, an attempt should be made to minimize the number of separate notifications for these changes. Where the changes are incorporated into a completely revised notice, the items that were changed from the previous notice should be identified. When changes are not numerous or complex, the party receiving the changed notification should make an effort to respond in less than 30 days.

When the notifying party believes a shorter response time is reasonable and appropriate, it may be helpful for that party to so indicate in the notice and perhaps suggest a response date;

(ix) If, after coordination is successfully completed, it is determined that a subsequent change could have no impact on some parties receiving the original notification, these parties must be notified of the change and of the coordinator's opinion that no response is required;

(x) Applicants, permittees and licensees should supply to all other applicants, permittees and licensees within their areas of operations, the name, address and telephone number of their coordination representatives. Upon request from coordinating applicants, permittees and licensees, data and information concerning existing or proposed facilities and future growth plans in the area of interest should be furnished unless such request is unreasonable or would impose a significant burden in compilation;

(xi) Parties should keep other parties with whom they are coordinating advised of changes in plans for facilities previously coordinated. If applications have not been filed 6 months after coordination was initiated, parties may assume that such frequency use is no longer desired unless a second notification has been received within 10 days of the end of the 6 month period. Renewal notifications are to be sent to all originally notified parties, even if coordination has not been successfully completed with those parties; and

(xii) Any frequency reserved by a licensee for future use in the bands subject to this part must be released for use by another licensee, permittee or applicant upon a showing by the latter that it requires an additional frequency and cannot coordinate one that is not reserved for future use.

(e) Where frequency conflicts arise between co-pending applications in the Private Operational Fixed Point-to-Point Microwave, Common Carrier Fixed Point-to-Point Microwave and Local Television Transmission Services, it is the obligation of the later filing applicant to amend his application to remove the conflict, unless it can make a showing that the conflict cannot be reasonably eliminated. Where a frequency conflict is not resolved and no showing is submitted as to why the conflict cannot be resolved, the Commission may grant the first filed application and dismiss the later filed application(s) after giving the later filing applicant(s) 30 days to respond to the proposed action.

~~(f)(1) *Coordination and information sharing between MVDDS and NGSO FSS licensees in the 12.2 GHz to 12.7 GHz band.* Prior to the construction or addition of an MVDDS transmitting antenna in this frequency band, the MVDDS licensee shall provide notice of intent to construct the proposed antenna site to NGSO FSS licensees operating in the 12.2-12.7 GHz frequency band and maintain an Internet web site of all existing transmitting sites and transmitting antennas that are scheduled for operation within one year including the "in service" dates. In addition to the location of a proposed new transmitting antenna, MVDDS licensees shall provide to the NGSO FSS licensees a technical description of the operating characteristics of the proposed transmission facility. At a minimum, the following information must be included in each notification:~~

(~~i~~f) ~~Name of MVDDS licensee;~~[Reserved]

~~(ii) Geographic location (including NAD83 coordinates) of proposed MVDDS transmitting antenna;~~

~~(iii) Maximum EIRP per 24 MHz;~~

~~(iv) Height above average terrain of the transmitting antenna;~~

~~(v) Type of antenna to be utilized;~~

~~(vi) Main beam azimuth and altitude orientation for the proposed transmitting antenna;~~

~~(vii) Theoretically modeled antenna radiation pattern;~~

~~(viii) Type(s) of emissions, and;~~

~~(ix) Description of the proposed service area.~~

~~(2) If the proposed MVDDS antenna site does not meet the minimum spacing requirements on the date of original notification or on subsequent annual anniversary dates of non-operation as set forth in §101.129, then the MVDDS licensee shall not construct the proposed transmission facility unless all NGSO FSS licensees having active subscribers within the minimum separation distance agree to a shorter spacing. Nothing in this section shall preclude MVDDS and NGSO FSS licensees from agreeing to accept the siting of new MVDDS transmitting antennas that do no meet the minimum distance set forth in §101.129. Incumbent point-to-point licensees' (those not licensed as MVDDS) facilities are to be operated in the band 12,200-12,700 MHz following the procedures, technical standards, and requirements of §101.105 in order to protect stations providing Direct Broadcast Satellite Service.~~

(g) *Licensees operating in Basic Trading Areas authorized in the Local Multipoint Distribution Service.* (1) When the transmitting facilities in a Basic Trading Area (BTA) are to be operated in the bands 27,500-28,350 MHz; 29,100-29,250 MHz; and 31,000-31,300 MHz and the facilities are located within 20 kilometers of the boundaries of a BTA, each licensee must complete the frequency coordination process of paragraph (d)(2) of this section with respect to neighboring BTA licensees that may be affected by its operations prior to initiating service. In addition, all licensed transmitting facilities operating in the bands 31,000-31,075 MHz and 31,225-31,300 MHz and located within 20 kilometers of neighboring facilities must complete the frequency coordination process of paragraph (d)(2) of this section with respect to such authorized operations before initiating service.

(2) Response to notification should be made as quickly as possible, even if no technical problems are anticipated. Any response to notification indicating potential interference must specify the technical details and must be provided to the applicant, either electronically or in writing, within the 30-day notification period. Every reasonable effort should be made by all licensees to eliminate all problems and conflicts. If no response to notification is received within 30 days, the licensee will be deemed to have made reasonable efforts to coordinate and commence operation without a response. The beginning of the 30-day period is determined pursuant to paragraph (d)(2)(v) of this section.

(h) *Special requirements for operations in the band 29,100-29,250 MHz.* (1)(i) Local Multipoint Distribution Service (LMDS) receive stations operating on frequencies in the 29,100-29,250 MHz band within a radius of 75 nautical miles of the geographic coordinates provided by a non-GSO-MSS licensee pursuant to §101.113(c)(2) or (c)(3)(i) (the “feeder link earth station complex protection zone”) shall accept any interference caused to them by such earth station complexes and shall not claim protection from such earth station complexes.

(ii) LMDS licensees operating on frequencies in the 29,100-29,250 MHz band outside a feeder link earth station complex protection zone shall cooperate fully and make reasonable efforts to resolve technical problems with the non-GSO MSS licensee to the extent that transmissions from the non-GSO MSS operator's feeder link earth station complex interfere with an LMDS receive station.

(2) No more than 15 days after the release of a public notice announcing the commencement of LMDS auctions, feeder link earth station complexes to be licensed pursuant to §25.257 of this chapter shall be specified by a set of geographic coordinates in accordance with the following requirements: no feeder link earth station complex may be located in the top eight (8) metropolitan statistical areas (MSAs), ranked by population, as defined by the Office of Management and Budget as of June 1993, using estimated populations as of December 1992; two (2) complexes may be located in MSAs 9

through 25, one of which must be Phoenix, AZ (for a complex at Chandler, AZ); two (2) complexes may be located in MSAs 26 to 50; three (3) complexes may be located in MSAs 51 to 100, one of which must be Honolulu, Hawaii (for a complex at Waimea); and the three (3) remaining complexes must be located at least 75 nautical miles from the borders of the 100 largest MSAs or in any MSA not included in the 100 largest MSAs. Any location allotted for one range of MSAs may be taken from an MSA below that range.

(3)(i) Any non-GSO MSS licensee may at any time specify sets of geographic coordinates for feeder link earth station complexes with each earth station contained therein to be located at least 75 nautical miles from the border of the 100 largest MSAs.

(ii) For purposes of paragraph (h)(3)(i) of this section, non-GSO MSS feeder link earth station complexes shall be entitled to accommodation only if the affected non-GSO MSS licensee preapplies to the Commission for a feeder link earth station complex or certifies to the Commission within sixty days of receiving a copy of an LMDS application that it intends to file an application for a feeder link earth station complex within six months of the date of receipt of the LMDS application.

(iii) If said non-GSO MSS licensee application is filed later than six months after certification of the Commission, the LMDS and non-GSO MSS entities shall still cooperate fully and make reasonable efforts to resolve technical problems, but the LMDS licensee shall not be obligated to re-engineer its proposal or make changes to its system.

(4) LMDS licensees or applicants proposing to operate hub stations on frequencies in the 29,100-29,250 MHz band at locations outside of the 100 largest MSAs or within a distance of 150 nautical miles from a set of geographic coordinates specified under paragraphs (h)(2) or (h)(3)(i) of this section shall serve copies of their applications on all non-GSO MSS applicants, permittees or licensees meeting the criteria specified in §25.257(a). Non-GSO MSS licensees or applicants shall serve copies of their feeder link earth station applications, after the LMDS auction, on any LMDS applicant or licensee within a distance of 150 nautical miles from the geographic coordinates that it specified under §101.113(c)(2) or (c)(3)(i). Any necessary coordination shall commence upon notification by the party receiving an application to the party who filed the application. The results of any such coordination shall be reported to the Commission within sixty days. The non-GSO MSS earth station licensee shall also provide all such LMDS licensees with a copy of its channel plan.

(i)(1) When the licensed facilities are to be operated in the band 38,600 MHz to 40,000 MHz and the facilities are located within 16 kilometers of the boundaries of an Economic Area, each licensee must complete the frequency coordination process of subsection 101.103(d) with respect to neighboring EA licensees and existing licensees within its EA service area that may be affected by its operation prior to initiating service. In addition to the technical parameters listed in subsection 101.103(d), the coordinating licensee must also provide potentially affected parties technical information related to its subchannelization plan and system geometry.

(2) Response to notification should be made as quickly as possible, even if no technical problems are anticipated. Any response to notification indicating potential interference must specify the technical details and must be provided to the licensee, either electronically or in writing, within 10 days of notification. Every reasonable effort should be made by all licensees to eliminate all problems and conflicts. If no response to notification is received within 10 days, the licensee will be deemed to have made reasonable efforts to coordinate and may commence operation without a response. The beginning of the 10-day period is determined pursuant to §101.103(d)(v).

[61 FR 26677, May 28, 1996, as amended at 62 FR 23165, Apr. 29, 1997; 63 FR 6105, Feb. 6, 1998; 63 FR 9448, Feb. 25, 1998; 63 FR 14039, Mar. 24, 1998; 63 FR 68983, Dec. 14, 1998; 64 FR 45893, Aug. 23, 1999; 65 FR 38328, June 20, 2000; 67 FR 43037, June 26, 2002; 76 FR 59571, Sept. 27, 2011]

§101.105 Interference protection criteria.

(a) The interference protection criteria for fixed stations subject to this part are as follows:

(1) To long-haul analog systems, employing frequency modulated radio and frequency division multiplexing to provide multiple voice channels, the allowable interference level per exposure:

(i) Due to co-channel sideband-to-sideband interference must not exceed 5 pwpO (Picowatts of absolute noise power psophometrically weighted (pwpO), appearing in an equivalent voice band channel of 300-3400 Hz); or

(ii) Due to co-channel carrier-beat interference must not exceed 50 pwpO.

(2) To short-haul analog systems employing frequency modulated radio and frequency division multiplexing to provide multiple voice channels, the allowable interference level per exposure:

(i) Due to co-channel sideband-to-sideband interference must not exceed 25 pwpO except in the 952-960 MHz band interference into single link fixed relay and control stations must not exceed 250 pwpO per exposure; or

(ii) Due to co-channel carrier-beat interference must not exceed 50 pwpO except in the 952-960 MHz band interference into single link fixed relay and control stations must not exceed 1000 pwpO per exposure.

(3) FM-TV. In analog systems employing frequency modulated radio that is modulated by a standard, television (visual) signal, the allowable interference level per exposure may not exceed the levels which would apply to long-haul or short-haul FM-FDM systems, as outlined in paragraphs (b) (1) and (2) of this section, having a 600-1200 voice channel capacity.

~~(4) 12.2-12.7 GHz band. (i) To accommodate co-primary NGSO FSS earth stations in the 12.2-12.7 GHz band, the PFD of an MVDDS transmitting system must not exceed −135 dBW/m^2 in any 4 kHz band at a reference point at the surface of the earth at a distance greater than 3 kilometers from the MVDDS transmitting antenna.~~

~~(ii) To accommodate co-primary Direct Broadcast Satellite Service earth stations, an MVDDS transmitting system must not exceed the EPFD levels specified in paragraph (a)(4)(ii)(B) of this section at any DBS subscriber location in accordance with the procedures listed in §101.1440 of this part.~~

~~(A) Definition of equivalent power flux-density: The equivalent power flux-density (EPFD) is the power flux-density produced at a direct broadcast service (DBS) receive earth station, taking into account shielding effects and the off-axis discrimination of the receiving antenna assumed to be pointing at the appropriate DBS satellite(s) from the transmitting antenna of a multichannel video distribution and data service (MVDDS) transmit station. The EPFD in dBW/m^2 in the reference bandwidth is calculated using the following formula:~~

$$EPFD = 10 * \log_{10}\left[\frac{P_{out} * G_m(\theta_m, \phi_m) * G_e(\theta_e, \phi_e) * I}{G_{e\max} * 4 * \pi * d^2}\right]$$

(4) [Reserved]

~~Where:~~

~~P_{out} = Total output power of the MVDDS transmitter (watts) into antenna~~

~~$G_m(\theta_m,\varphi_m)$ = Gain of the MVDDS antenna in the direction of the DBS earth station~~

~~$G_e(\theta_e,\varphi_e)$ = Gain of the earth station in the direction of the MVDDS antenna~~

~~I = Interference scaling factor for the earth station (1 dB for MVDDS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.*, a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report available at *http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf*).~~

~~$G_{e,\ max}$ = Maximum gain of the DBS earth station~~

~~d = the distance between the MVDDS transmitting antenna and the DBS earth station (meters)~~

~~(B) Regional equivalent power flux density levels:~~

~~(*1*) −168.4 dBW/m²/4kHz in the Eastern region consisting of the District of Columbia and the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida;~~

~~(*2*) −169.8 dBW/m²/4kHz in the Midwestern region consisting of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas;~~

~~(*3*) −171.0 dBW/m²/4kHz in the Southwestern region consisting of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37° North Latitude);~~

~~(*4*) −172.1 dBW/m²/4kHz in the Northwestern region consisting of the following states: Washington, Oregon, California (north of 37° North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.~~

~~(iii) Except for public safety entities, harmful interference protection from MVDDS stations to incumbent point-to-point 12 GHz fixed stations is not required. Incumbent point-to-point private operational fixed 12 GHz stations, except for public safety entities, are required to protect MVDDS stations under the process described in §101.103(d) of this part.~~

(5) *71,000-76,000 MHz; 81,000-86,000 MHz.* In these bands the following interference criteria shall apply:

(i) For receivers employing digital modulation: based upon manufacturer data and following TSB 10-F or other generally acceptable good engineering practice, for each potential case of interference a threshold-to-interference ratio (T/I) shall be determined that would cause 1.0 dB of degradation to the static threshold of the protected receiver. For the range of carrier power levels (C) between the clear-air (unfaded) value and the fully-faded static threshold value, in no case shall interference cause C/I to be less than the T/I so determined unless it can be shown that the availability of the affected receiver would still be acceptable despite the interference.

(ii) For receivers employing analog modulation: manufacturer data or industry criteria will specify a baseband signal-to-noise requirement (S/N) of the receiver that will result in acceptable signal quality for continuous operation. Following TSB 10-F or other generally acceptable good engineering practice, for each potential case of interference a C/I objective shall be calculated to ensure that this S/N will not be degraded by more than 1.0 dB. For the range of carrier power levels (C) between the clear-air (unfaded) value and the fully-faded threshold value, in no case shall interference cause the C/I to be less than the

objective so determined unless it can be shown that the signal quality and availability of the affected receiver would still be acceptable despite the interference.

(6) *92,000-94,000 MHz; 94,100-95,000 MHz.* In these bands prior links shall be protected to a threshold-to-interference ratio (T/I) level of 1.0 dB of degradation to the static threshold of the protected receiver. Any new link shall not decrease a previous link's desired-to-undesired (D/U) signal ratio below a minimum of 36 dB, unless the earlier link's licensee agrees to accept a lower D/U.

(7) All stations operating under this part must protect the radio quiet zones as required by §1.924 of this chapter. Stations authorized by competitive bidding are cautioned that they must receive the appropriate approvals directly from the relevant quiet zone entity prior to operating.

(b) In addition to the requirements of paragraph (a) of this section the adjacent channel interference protection criteria to be afforded, regardless of system length, or type of modulation, multiplexing, or frequency band, must be such that the interfering signal does not produce more than 1.0 dB degradation of the practical threshold of the protected receiver. The “practical threshold” of the protected receiver can be based upon the definition in TSB 10, referenced in paragraph (c) of this section, or upon alternative generally acceptable good engineering standards.

(c) *Applying the criteria.* (1) Guidelines for applying the interference protection criteria for fixed stations subject to this part are specified in the Telecommunications Industry Association's Telecommunications Systems Bulletin TSB 10, “Interference Criteria for Microwave Systems” (TSB 10). Other procedures that follow generally acceptable good engineering practices are also acceptable to the Commission.

(2) If TSB 10 guidelines cannot be used, the following interference protection criteria may be used by calculating the ratio in dB between the desired (carrier signal) and the undesired (interfering) signal (C/I ratio) appearing at the input to the receiver under investigation (victim receiver). Except as provided in §101.147 where the applicant's proposed facilities are of a type not included in paragraphs (a) and (b) of this section or where the development of the carrier-to-interference (C/I) ratio is not covered by generally acceptable procedures, or where the applicant does not wish to develop the carrier-to-interference ratio, the applicant must, in the absence of criteria or a developed C/I ratio, employ the following C/I protection ratios:

(i) *Co-Channel Interference.* Both side band and carrier-beat, applicable to all bands; the existing or previously authorized system must be afforded a carrier to interfering signal protection ratio of at least 90 dB, except in the 952-960 MHz band where it must be 75dB, and in the 71,000-76,000 MHz and 81,000-86,000 MHz bands where the criteria in paragraph (a)(5) of this section applies, and in the 92,000-94,000 MHz and 94,100-95,000 MHz bands, where the criteria in paragraph (a)(6) of this section applies; or

(ii) *Adjacent Channel Interference.* Applicable to all bands; the existing or previously authorized system must be afforded a carrier to interfering signal protection ratio of at least 56 dB, except in the 71,000-76,000 MHz and 81,000-86,000 MHz bands where the criteria in paragraph (a)(5) of this section applies, and in the 92,000-94,000 MHz and 94,100-95,000 MHz bands, where the criteria in paragraph (a)(6) of this section applies.

(3) Applicants for frequencies listed in §101.147(b)(1) through (4) must make the following showings that protection criteria have been met over the entire service area of existing systems. Such showings may be made by the applicant or may be satisfied by a statement from a frequency coordinator.

(i) For site-based multiple address stations in the 928-929/952-960 MHz and the 932-932.5/941-941.5 MHz bands, a statement that the proposed system complies with the following co-channel separations from all existing stations and pending applications:

Fixed-to-fixed—145 km;

Fixed-to-mobile—113 km;

Mobile-to-mobile—81 km

NOTE TO PARAGRAPH (C)(3)(I): Multiple address systems employing only remote stations will be treated as mobile for the purposes of determining the appropriate separation. For mobile operation, the mileage is measured from the reference point specified on the license application. For fixed operation on subfrequencies in accordance with §101.147 the mileage also is measured from the reference point specified on the license application.

(ii) In cases where the geographic separation standard in paragraph (c)(3)(i) of this section is not followed, an engineering analysis must be submitted to show the coordination of the proposed assignment with existing systems located closer than those standards. The engineering analyses will include:

(A) Specification of the interference criteria and system parameters used in the interference study;

(B) Nominal service areas of each system included in the interference analysis;

(C) Modified service areas resulting from the proposed system. The propagation models used to establish the service boundary limits must be specified and any special terrain features considered in computing the interference impact should be described; and

(D) A statement that all parties affected have agreed to the engineering analysis and will accept the calculated levels of interference.

(iii) MAS EA licensees shall provide protection in accordance with §101.1333.

(4) Multiple address systems operating on subfrequencies in accordance with §101.147 that propose to operate master stations at unspecified locations must define the operating area by a radius about a geographical coordinate and describe how interference to co-channel users will be controlled.

(5) Multiple address frequencies in the 956.25-956.45 MHz bands may be assigned for use by mobile master stations on a primary basis. Multiple address frequencies in the 941.0-941.5 MHz bands that are licensed on a site-by-site basis and the 952 MHz bands may be assigned for use by primary mobile master stations on a case-by-case basis if the 956.25-956.45 MHz frequencies are unavailable. Multiple address mobile (master and remote) operation is permitted on frequencies licensed by geographic area subject to the interference protection criteria set forth in §101.1333, *i.e.,* adjacent channel site-based licensees and co-channel operations in adjacent EAs. Mobile operation in the 959.85-960 MHz band is not permitted.

(6) Each application for new or modified nodal station on channels numbered 4A, 4B, 7, 9, and 19/20 in the 10.6 GHz band must demonstrate that all existing co-channel stations are at least 56 kilometers from the proposed nodal station site. Applicants for these channels must certify that all licensees and applicants for stations on the adjacent channels within 56 kilometers of the proposed nodal station have been notified of the proposed station and do not object. Alternatively, or if one of the affected adjacent channel interests does object, the applicant may show that all affected adjacent channel parties are provided a C/I protection ratio of 0 dB. An applicant proposing to operate at an AAT

greater than 91 meters must reduce its EIRP in accordance with the following table; however, in no case may EIRP exceed 70 dBm on the 10.6 GHz channels:

AAT (meters)	EIRP dBm
Above 300	+ 38
251 to 300	41
201 to 250	43
151 to 200	49
101 to 150	55
100 and below	85

(7) Each application for new or modified nodal station on channels numbered 21, 22, 23, and 24 in the 10.6 GHz band must include an analysis of the potential for harmful interference to all other licensed and previously applied for co-channel and adjacent channel stations located within 80 kilometers of the location of the proposed station. The criteria contained in §101.103(d)(2) must be used in this analysis. Applicants must certify that copies of this analysis have been served on all parties which might reasonably be expected to receive interference above the levels set out in §101.103(d)(2) within 5 days of the date the subject application is filed with the Commission.

(8) If the potential interference will exceed the prescribed limits, a statement shall be submitted with the application for new or modified stations to the effect that all parties have agreed to accept the higher level of interference.

(d) Effective August 1, 1985, when a fixed station that conforms to the technical standards of this subpart ~~(or, in the case of the 12,200-12,700 MHz band, for an incumbent non-MVDDS station or a direct broadcast satellite station)~~ receives or will receive interference in excess of the levels specified in this section as a result of an existing licensee's use of non-conforming equipment authorized between July 20, 1961 and July 1, 1976, and the interference would not result if the interfering station's equipment complied with the current technical standards, the licensee of the non-conforming station must take whatever steps are necessary to correct the situation up to the point of installing equipment which fully conforms to the technical standards of this subpart. In such cases, if the engineering analysis demonstrates that:

(1) The conforming station would receive interference from a non-conforming station in excess of the levels specified in this section; and

(2) The interference would be eliminated if the non-conforming equipment were replaced with equipment which complies with the standards of this subpart, the licensee (or prospective licensee) of the station which would receive interference must provide written notice of the potential interference to both the non-conforming licensee and the Commission's office in Gettysburg, PA. The non-conforming licensee must make all required equipment changes within 180 days from the date of official Commission notice informing the licensee that it must upgrade its equipment, unless an alternative solution has been agreed to by all parties involved in the interference situation. If a non-conforming licensee fails to make all required changes within the specified period of time, the Commission may require the licensee to suspend operation until the changes are completed.

(e) *Interference dispute resolution procedures.* Should a licensee licensed under this part receive harmful interference from another licensee licensed under this chapter, the parties involved shall comply with the dispute resolution procedures set forth herein:

(1) The licensee experiencing the harmful interference shall notify the licensee believed to be causing the harmful interference and shall supply information describing its problem and supporting its claim;

(2) Upon receipt of the harmful interference notice, the licensee alleged to be causing the harmful interference shall respond immediately and make every reasonable effort to identify and resolve the conflict; and

(3) Licensees are encouraged to resolve the harmful interference prior to contacting the Commission.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68983, Dec. 14, 1998; 65 FR 17449, Apr. 3, 2000; 65 FR 38329, June 20, 2000; 65 FR 59358, Oct. 5, 2000; 66 FR 35110, July 3, 2001; 67 FR 43038, June 28, 2002; 69 FR 31746, June 7, 2004; 70 FR 29996, May 25, 2005]

§101.107 Frequency tolerance.

(a) The carrier frequency of each transmitter authorized in these services must be maintained within the following percentage of the reference frequency except as otherwise provided in paragraph (b) of this section or in the applicable subpart of this part (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency (MHz)	Frequency tolerance (percent)
928 to 929[5]	0.0005
932 to 932.5	0.00015
932.5 to 935	0.00025
941 to 941.5	0.00015
941.5 to 944	0.00025
952 to 960[5]	0.0005
1,850 to 1,990	0.002
2,110 to 2,200	0.001
2,450 to 2,500[1]	0.001
3,700 to 4,200[1]	0.005
5,925 to 6,875[1]	0.005
6,875 to 7,125[1]	0.005
10,550 to 11,700[1 2]	0.005
11,700 to 12,200[1]	0.005
12,200 to 13,250[4]	0.005
14,200 to 14,400	0.03
17,700 to 18,820[3]	0.003
18,820 to 18,920[3]	0.001
928 to 929[5]	0.0005
18,920 to 19,700[3]	0.003
19,700 to 27,500[4 7]	0.001
27,500 to 28,350	0.001
29,100 to 29,250	0.001
31,000 to 31,300[6]	0.001
31,300 to 40,000[4]	0.03
71,000 to 76,000[8]	
81,000 to 86,000[8]	
92,000 to 95,000[8]	

* * * * *

[1]Applicable only to common carrier LTTS stations. Tolerance for 2450-2500 MHz is 0.005%. Beginning Aug. 9, 1975, this tolerance will govern the marketing of LTTS equipment and the issuance of all such authorizations for new radio equipment. Until that date new equipment may be authorized with a

frequency tolerance of .03% in the frequency range 2,200 to 10,500 MHz and .05% in the range 10,500 MHz to 12,200 MHz, and equipment so authorized may continue to be used for its life provided that it does not cause interference to the operation of any other licensee. Beginning March 1, 2005, new LTTS operators will not be licensed and existing LTTS licensees will not be renewed in the 11.7-12.2 GHz band.

[2]*See* subpart G of this part for the stability requirements for transmitters used in the Digital Electronic Message Service.

[3]Existing type accepted equipment with a frequency tolerance of ±0.03% may be marketed until December 1, 1988. Equipment installed and operated prior to December 1, 1988 may continue to operate after that date with a minimum frequency tolerance of ±0.03%. However, the replacement of equipment requires that the current tolerance be met.

[4]Applicable to private operational fixed point-to-point microwave ~~and stations providing MVDDS~~.

[5]For private operational fixed point-to-point microwave systems, with a channel greater than or equal to 50 KHz bandwidth, ±0.0005%; for multiple address master stations, regardless of bandwidth, ±0.00015%; for multiple address remote stations with 12.5 KHz bandwidths, ±0.00015%; for multiple address remote stations with channels greater than 12.5 KHz bandwidth, ±0.0005%.

[6]For stations authorized prior to March 11, 1997, transmitter tolerance shall not exceed 0.03%.

[7]The frequency tolerance for stations authorized on or before April 1, 2005 is 0.03%. Existing licensees and pending applicants on that date may continue to operate after that date with a frequency tolerance of 0.03%, provided that it does not cause harmful interference to the operation of any other licensee. For analog systems, if the channel bandwidth is greater than 30 MHz up to 50 MHz, the frequency tolerance standard will be 0.03%; if the channel bandwidth is 30 MHz or less, then the frequency tolerance standard will be 0.003%. This analog standard is conditional provided that harmful interference is not caused to digital stations operating within the 0.001% tolerance standards. If harmful interference is caused to stations operating with the more stringent standard, the onus shall be on the operators with the less stringent parameters to develop an engineering solution to the problem. For exceptions, *see* §101.147 and §101.507.

[8]Equipment authorized to be operated in the 71,000-76,000 MHz, 81,000-86,000 MHz, 92,000-94,000 MHz and 94,100-95,000 MHz bands is exempt from the frequency tolerance requirement noted in the table of paragraph (a) of this section.

(b) Heterodyne microwave radio systems may be authorized at a somewhat less restrictive frequency tolerance (up to .01 percent) to compensate for frequency shift caused by numerous repeaters between base band signal insertion. Where such relaxation is sought, applicant must provide all calculations and indicate the desired tolerance over each path. In such instances the radio transmitters and receivers used must individually be capable of complying with the tolerance specified in paragraph (a) of this section. Heterodyne operation is restricted to channel bandwidth of 10 MHz or greater.

(c) As an additional requirement in any band where the Commission makes assignments according to a specified channel plan, provisions must be made to prevent the emission included within the occupied bandwidth from radiating outside the assigned channel at a level greater than that specified in §101.111.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23167, Apr. 29, 1997; 63 FR 6105, Feb. 6, 1998; 63 FR 9448, Feb. 25, 1998; 63 FR 14039, Mar. 24, 1998; 63 FR 36611, July 7, 1998; 66 FR 35110, July 3, 2001; 67 FR 43038,

June 26, 2002; 68 FR 4956, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 69 FR 16832, Mar. 31, 2004; 70 FR 4787, Jan. 31, 2005; 76 FR 59572, Sept. 27, 2011]

§101.109 Bandwidth.

(a) Each authorization issued pursuant to these rules will show, as the emission designator, a symbol representing the class of emission which must be prefixed by a number specifying the necessary bandwidth. This figure does not necessarily indicate the bandwidth actually occupied by the emission at any instant. In those cases where part 2 of this chapter does not provide a formula for the computation of the necessary bandwidth, the occupied bandwidth may be used in the emission designator.

(b) Stations in this service will be authorized any type of emission, method of modulation, and transmission characteristic, consistent with efficient use of the spectrum and good engineering practice, except that Type B, damped-wave emission will not be authorized.

(c) The maximum bandwidth which will be authorized per frequency assigned is set out in the table that follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency band (MHz)	**Maximum authorized bandwidth**
928 to 929	25 kHz[1 5 6]
932 to 932.5, 941 to 941.5	12.5 kHz[1 5 6]
932.5 to 935, 941.5 to 944	200 kHz[1]
952 to 960	200 KHz[1 5 6]
1,850 to 1,990	10 MHz[1]
2,110 to 2,130	3.5 MHz
2,130 to 2,150	800 or 1600 KHz[1]
2,150 to 2,160	10 MHz
2,160 to 2,180	3.5 MHz
2,180 to 2,200	800 or 1600 KHz[1]
2,450 to 2,483.5	625 KHz[2]
2,483.5 to 2,500	800 KHz
3,700 to 4,200	20 MHz
5,925 to 6,425	[1]60
6,425 to 6,525	25 MHz
6,525 to 6,875	30 MHz.[1]
6,875 to 7,125	25 MHz[1]
10,550 to 10,680	5 MHz[1]
10,700 to 11,700	[1]80
12,200 to 12,700[8]	500 megahertz
12,700 to 13,150	50 MHz
13,200 to 13,250	25 MHz
17,700 to 18,140	220 MHz[1]
18,140 to 18,142	2 MHz
18,142 to 18,580	6 MHz
18,580 to 18,820	20 MHz[1]
18,820 to 18,920	10 MHz
18,920 to 19,160	20 MHz[1]
19,160 to 19,260	10 MHz
19,260 to 19,700	220 MHz[1]
21,200 to 23,600	50 MHz[1 4]

24,250 to 25,250	40 MHz[7]
27,500 to 28,350	850 MHz
29,100 to 29,250	150 MHz
31,000 to 31,075	75 MHz
31,075 to 31,225	150 MHz
31,225 to 31,300	75 MHz
38,600 to 40,000	50 MHz[7]
71,000 to 76,000	5000 MHz
81,000 to 86,000	5000 MHz
92,000 to 95,000	([3])

[1]The maximum bandwidth that will be authorized for each particular frequency in this band is detailed in the appropriate frequency table in §101.147. If contiguous channels are aggregated in the 928-928.85/952-952.85/956.25-956.45 MHz, the 928.85-929/959.85-960 MHz, or the 932-932.5/941-941.5 MHz bands, then the bandwidth may exceed that which is listed in the table.

[2]1250 KHz, 1875 KHz, or 2500 KHz on a case-by-case basis.

[3]To be specified in authorization. For the band 92 to 95 GHz, maximum bandwidth is licensed in one segment of 2 GHz from 92-94 GHz and one 0.9 GHz segment from 94.1 to 95 GHz, or the total of the loaded band if smaller than the assigned bandwidth.

[4]For exceptions, see §101.147(s).

[5]A 12.5 kHz bandwidth applies only to frequencies listed in §101.147(b)(1) through (4).

[6]For frequencies listed in §101.147(b)(1) through (4), consideration will be given on a case-by-case basis to authorizing bandwidths up to 50 kHz.

[7]For channel block assignments in the 24,250-25,250 MHz and 38,600-40,000 MHz bands, the authorized bandwidth is equivalent to an unpaired channel block assignment or to either half of a symmetrical paired channel block assignment. When adjacent channels are aggregated, equipment is permitted to operate over the full channel block aggregation without restriction.

NOTE TO FOOTNOTE 7: Unwanted emissions shall be suppressed at the aggregate channel block edges based on the same roll-off rate as is specified for a single channel block in §101.111(a)(1) or in §101.111(a)(2)(ii) and (iii) as appropriate.

[8]For incumbent private operational fixed point-to-point stations in this band ~~(those not licensed as MVDDS)~~, the maximum bandwidth shall be 20 MHz.

[61 FR 26677, May 28, 1996, as amended at 61 FR 44181, Aug. 28, 1996; 62 FR 23167, Apr. 29, 1997; 62 FR 24582, May 6, 1997; 63 FR 6105, Feb. 6, 1998; 65 FR 17449, Apr. 3, 2000; 65 FR 38329, June 20, 2000; 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4956, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 70 FR 29997, May 25, 2005; 75 FR 41771, July 19, 2010; 76 FR 59572, Sept. 27, 2011; 77 FR 54432, Sept. 5, 2012]

§101.111 Emission limitations.

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) When using transmissions other than those employing digital modulation techniques:

(i) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 decibels;

(ii) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 decibels;

(iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(2) When using transmissions employing digital modulation techniques (see §101.141(b)) in situations not covered in this section:

(i) For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

A = 35 + 0.8(P −50) + 10 Log10 B. (Attenuation greater than 80 decibels or to an absolute power of less than −13 dBm/1MHz is not required.) where:

A = Attenuation (in decibels) below the mean output power level.

P = Percent removed from the center frequency of the transmitter bandwidth.

B = Authorized bandwidth in MHz.

~~NOTE: MVDDS operations in the 12.2-12.7 GHz band shall use 24 megahertz for the value of B in the emission mask equation set forth in this section. The emission mask limitation shall only apply at the 12.2-12.7 GHz band edges and does not restrict MVDDS channelization bandwidth within the band.~~

(ii) For operating frequencies above 15 GHz, in any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 11 decibels:

A = 11 + 0.4(P−50) + 10 Log_{10} B. (Attenuation greater than 56 decibels or to an absolute power of less than −13 dBm/1MHz is not required.)

(iii) In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation. The authorized bandwidth includes the nominal radio frequency bandwidth of an individual transmitter/modulator in block-assigned bands. Equipment licensed prior to April 1, 2005 shall only be required to meet this standard in any 4 kHz band.

(iv) The emission mask for LMDS and the 24 GHz Service shall use the equation in paragraph (a)(2)(ii) of this section and apply it only to the band edge of each block of spectrum, but not to subchannels established by licensees. The value of P in the equation is the percentage removed from the carrier frequency and assumes that the carrier frequency is the center of the actual bandwidth used. The emission mask can be satisfied by locating a carrier of the subchannel sufficiently far from the channel edges so that the emission levels of the mask are satisfied. The LMDS or 24 GHz emission mask shall use a value B (bandwidth) of 40 MHz, for all cases even in the case where a narrower subchannel is used (for instance the actual bandwidth is 10 MHz) and the mean output power used in the calculation is the sum of the output power of a fully populated channel. For block assigned channels, the out-of-band emission limits apply only outside the assigned band of operation and not within the band.

(v) The emission mask for the 71-76 GHz, 81-86 GHz, 92-94 GHz, and 94.1-95 GHz bands used in the equation in paragraph (a)(2)(ii) of this section applies only to the edge of each channel, but not to sub-channels established by licensees. The value of P in the equation is for the percentage removed from the carrier frequency and assumes that the carrier frequency is the center of the actual bandwidth used. The value of B will always be 500 MHz. In the case where a narrower sub-channel is used within the assigned bandwidth, such sub-carrier will be located sufficiently far from the channel edges to satisfy the emission levels of the mask. The mean output power used in the calculation is the sum of the output power of a fully populated channel.

(3) For Digital Termination System channels used in the Digital Electronic Message Service (DEMS) operating in the 10,550-10,680 MHz band:

(i) In any 4 KHz band, the center frequency of which is removed from the edge of the DEMS channel by up to and including 1.125 times the DEMS subchannel bandwidth: As specified by the following equation may in no event be less than $50 + 10 \log_{10} N$ decibels:

$$A = 50 + 0.0333(F - 0.5B) + 10 \log_{10} N \text{ decibels}$$

Where:

A = Attenuation (in decibels) below means output power level contained within the DEMS channel for a given polarization.

B = Bandwidth of DEMS channel (in KHz).

F = Absolute value of the difference between the center frequency of the 4 KHz band measured and the center frequency of the DEMS channel (in KHz).

N = Number of active subchannels of the given polarization within the DEMS channel.

(ii) In any 4 KHz band within the authorized DEMS band the center frequency of which is removed from the center frequency of the DEMS channel by more than the sum of 50% of the DEMS channel bandwidth plus 1.125 times the subchannel bandwidth: As specified by the following equation but in no event less than 80 decibels:

$$A = 80 + 10 \log_{10} N \text{ decibels}$$

(iii) In any 4 KHz band the center frequency of which is outside the authorized DEMS band: At least $43 + 10 \log_{10}$(mean output power in watts) decibels.

(4) For DEMS channels in the 17,700-19,700 MHz band:

(i) In any 4 KHz band, the center frequency of which is removed from the frequency of the center of the DEMS channel by more than 50 percent of the DEMS channel bandwidth up to and including 50 percent plus 500 KHz: As specified by the following equation but in no event be less than $50 + 10 \log_{10} N$ decibels:

$$A = 50 + 0.06(F - 0.5B) + 10 \log_{10} N \text{ decibels}$$

Where:

A = Attenuation (in decibels) below means output power level contained within the DEMS channel for a given polarization.

B = Bandwidth of DEMS channel (in KHz).

F = Absolute value of the difference between the center frequency of the 4 KHz band measured and the center frequency of the DEMS channel (in KHz).

N = Number of active subchannels of the given polarization within the DEMS channel.

(ii) In any 4 KHz band within the authorized DEMS band, the center frequency of which is removed from the center frequency of the DEMS channel by more than the sum of 50 percent of the channel bandwidth plus 500 KHz: As specified by the following equation but in no event less than 80 decibels:

$A = 80 + 10 \log_{10} N$ decibels

(iii) In any 4 KHz band the center frequency of which is outside the authorized Digital Message Service band: At least $43 + 10 \log_{10}$ (mean output power in watts) decibels.

(5) When using transmissions employing digital modulation techniques on the 900 MHz multiple address frequencies with a 12.5 KHz bandwidth, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) in accordance with the following schedule:

(i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 2.5 KHz up to and including 6.25 KHz: At least $53 \log_{10}$ (fd/2.5) decibels;

(ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 6.25 KHz up to and including 9.5 KHz: At least $103 \log_{10}$ (fd/3.9) decibels;

(iii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 9.5 KHz up to and including 15 KHz: At least $157 \log_{10}$ (fd/5.3) decibels; and

(iv) On any frequency removed from the center of the authorized bandwidth by a displacement frequency greater than 15 KHz: At least 50 plus $10 \log_{10}$(P) or 70 decibels, whichever is the lesser attenuation.

(6) When using transmissions employing digital modulation techniques on the 900 MHz multiple address frequencies with a bandwidth greater than 12.5 KHz, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) in accordance with the following schedule:

(i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 5 KHz up to and including 10 KHz: At least $83 \log_{10}$ (fd/5) decibels;

(ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 10 KHz up to and including 250 percent of the authorized bandwidth: At least $116 \log_{10}$ (fd/6.1) decibels or 50 plus $10 \log_{10}$ (P) or 70 decibels, whichever is the lesser attenuation; and

(iii) On any frequency removed from the center of the authorized bandwidth by more that 250 percent of the authorized bandwidth: At least 43 plus $10 \log_{10}$ (output power in watts) decibels or 80 decibels, whichever is the lesser attenuation.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraph (a) of this section.

(c) The emission of an unmodulated carrier is prohibited except for test purposes as required for proper station and system maintenance.

(d) *Interference to passive sensors.* These limitations are necessary to minimize the probability of harmful interference to reception in the 10.6-10.68 GHz and 31-31.3 GHz bands onboard space stations in the Earth exploration-satellite service (passive).

(1) *10.6-10.68 GHz.* (i) Fixed stations are restricted to point-to-point operations, with each station supplying not more than ^3 dBW of transmitter power to the antenna, producing not more than 40 dBW of EIRP, and radiating at an antenna main beam elevation angle of 20° or less. Licensees holding a valid authorization on August 6, 2015 to operate in this band may continue to operate as authorized, subject to proper license renewal. Licensees are urged to:

(A) Limit the maximum transmitter power supplied to the antenna to ^15 dBW; and

(B) Employ automatic transmitter power control (ATPC).

(ii) The maximum transmitter power supplied to the antenna of stations using ATPC may be increased by a value corresponding to the ATPC range, up to a maximum of −3 dBW.

(2) *31-31.3 GHz.* For fixed stations authorized after August 6, 2018, the unwanted emissions power in any 100 MHz of the 31.3-31.5 GHz band shall be limited to −38 dBW (−38 dBW/100 MHz), as measured at the input to the antenna.

[61 FR 26677, May 28, 1996, as amended at 62 FR 24582, May 6, 1997; 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4957, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 69 FR 31746, June 7, 2004; 80 FR 38912, July 7, 2015]

§101.113 Transmitter power limitations.

(a) On any authorized frequency, the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below. In cases of harmful interference, the Commission may, after notice and opportunity for hearing, order a change in the effective radiated power of this station. Further, the output power of a transmitter on any authorized frequency in this service may not exceed the following:

	Maximum allowable EIRP[1 2]	
Frequency band (MHz)	**Fixed[1 2] (dBW)**	**Mobile (dBW)**
928.0-929.0(2)	+ 17	
932.0-932.5(2)	+ 17	
932.5-935.0	+ 40	
941.0-941.5(2)	+ 30	+ 14
941.5-944.0	+ 40	
952.0-960.0(2)	+ 40	+ 14
1,850-1,990	+ 45	

2,110-2,150	+ 45	
2,150-2,180[3]	+ 45	
2,180-2,200	+ 45	
2,450-2,500	+ 45	
2,500-2,686		
2,686-2,690	+ 45	
3,700-4,200	+ 55	
5,925-6,425	+ 55	
6,425-6,525		+ 35
6,525-6,875	+ 55	
6,875-7,125	+ 55	
10,550 to 10,600[5]	+ 55	
10,600 to 10,680[5]	+ 40	
10,700-11,700	+ 55	
12,200-~~12,700[11]~~12,700	+ 50	
12,700-13,200[4]	+ 50	
13,200-13,250[4]	+ 55	
14,200-~~14,400[12]~~14,400[11]	+ 45	
17,700-18,600	+ 55	
18,600-18,800[6]	+ 35	
18,800-19,700	[5]+ 55	
21,200-23,600[10]	+ 55	
24,250-25,250	[5]+ 55	
27,500-28,350[9]	+ 55	
29,100-29,250	([7])	
31,000 to 31,075[8 9]	30 dBW/MHz	30 dBW/MHz
31,075 to 31,225[8 9]	30 dBW/MHz	30 dBW/MHz
31,225 to 31,300[8 9]	30 dBW/MHz	30 dBW/MHz
38,600-40,000	+ 55	
71,000-~~76,000[13]~~76,000[12]	+ 55	+ 55
81,000-~~86,000[13]~~86,000[12]	+ 55	+ 55
92,000-95,000	+ 55	+ 55

[1]Per polarization.

[2]For multiple address operations, see §101.147. Remote alarm units that are part of a multiple address central station projection system are authorized a maximum of 2 watts.

[3]When an omnidirectional antenna is authorized in the 2150-2160 MHz band, the maximum power shall be 60 dBm.

[4]Also see §101.145.

[5]The output power of a DEMS System nodal transmitter shall not exceed 0.5 watt per 250 kHz. The output power of a DEMS System user transmitter shall not exceed 0.04 watt per 250 kHz. The transmitter power in terms of the watts specified is the peak envelope power of the emission measured at the associated antenna input port. The operating power shall not exceed the authorized power by more than 10 percent of the authorized power in watts at any time. Frequencies from 10,600-10,680 MHz are subject to footnote US265 in the Table of Frequency Allocations in §2.106 of the Commission's Rules. Stations authorized prior to April 1, 2003 to exceed the 40 dBW limit may continue to operate at their authorized output power level indefinitely, provided that neither end point of the relevant link is relocated.

[6]Maximum power delivered to the antenna shall not exceed −3 dBw.

[7]See §101.113(c).

[8]For stations authorized prior to March 11, 1997, and for non-Local Multipoint Distribution Service stations authorized pursuant to applications refiled no later than June 26, 1998, the transmitter output power shall not exceed 0.050 watt.

[9]For subscriber transceivers authorized in these bands, the EIRP shall not exceed 55 dBw or 42 dBw/MHz.

[10]See §101.147(s).

~~[11]The EIRP for MVDDS stations is limited to 14.0 dBm per 24 MHz (=16.0 dBW per 24 MHz). Incumbent point-to-point stations may use up to + 50 dBW except for low power systems which were licensed under §101.147(q).~~

~~[12]~~[11]Beginning March 1, 2005, no new LTTS operators will be licensed and no existing LTTS licensees will be renewed in the 14.2-14.4 GHz band.

~~[13]~~[12]The maximum transmitter power is limited to 3 watts (5 dBW) unless a proportional reduction in maximum authorized EIRP is required under §101.115. The maximum transmitter power spectral density is limited to 150 mW per 100 MHz.

(b) The power of transmitters that use Automatic Transmitter Power Control shall not exceed the power input or output specified in the instrument of station authorization. The power of non-ATPC transmitters shall be maintained as near as practicable to the power input or output specified in the instrument of station authorization.

(c)(1) *Transmitter power limitations.* Point-to-point stations in the 29.1-29.25 GHz band for the LMDS backbone between LMDS hubs shall be limited to a maximum allowable e.i.r.p. density per carrier of 23 dBW/MHz in any one megahertz in clear air, and may exceed this limit by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value due to precipitation and only to the extent that the link is impaired.

(2) *Hub transmitter EIRP spectral area, density limit.* LMDS applicants shall demonstrate that, under clear air operating conditions, the maximum aggregate of LMDS transmitting hub stations in a Basic Trading Area in the 29.1-29.25 GHz band will not transmit a co-frequency hub-to-subscriber e.i.r.p. spectral area density in any azimuthal direction in excess of X dBW/(MHz-km^2) when averaged over any 4.375 MHz band, where X is defined in Table 1. Individual hub stations may exceed their clear air e.i.r.p.s by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value and only to the extent that the link is impaired.

(i) The e.i.r.p. aggregate spectral area density is calculated as follows:

$$10\log_{10}\ 1/A\sum_{i=1}^{N} pigi\ \text{dBW/MHz-km}^2$$

where:

N = number of co-frequency hubs in BTA.

A = Area of BTA in km^2.

pi = spectral power density into antenna of i-th hub (in W/MHz).

gi = gain of i-th hub antenna at zero degree elevation angle.

Each pi and gi are in the same 1 MHz within the designated frequency band.

(ii) The climate zones in Table 1 are defined for different geographic locations within the US as shown in Appendix 28 of the ITU Radio Regulations.

TABLE 1[1]

Climate zone	e.i.r.p. Spectral Density (Clear Air) (dBW/MHz-km²)[2]
1	−23
2	−25
3,4,5	−26

[1]LMDS system licensees in two or more BTAs may individually or collectively deviate from the spectral area density computed above by averaging the power over any 200 km by 400 km area, provided that the aggregate interference to the satellite receiver is no greater than if the spectral area density were as specified in Table 1. A showing to the Commission comparing both methods of computation is required and copies shall be served on any affected non-GSO 20/30 GHz MSS providers.

[2]See §21.1007(c)(i) for the population density of the BTA.

(3) *Hub transmitter e.i.r.p. spectral area density limit at elevation angles above the horizon.* LMDS applicants shall demonstrate that, under clear air operating conditions, the maximum aggregate of LMDS transmitting hub stations in a Basic Trading Area in the 29.1-29.25 GHz band will not transmit a co-frequency hub-to-subscriber e.i.r.p. spectral area density in any azimuthal direction in excess of X dBW/(MHz-km²) when averaged over any 4.375 MHz band where X is defined in Table 2. Individual hub stations may exceed their clear air e.i.r.p.s by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value and only to the extent that the link is impaired.

(i) The e.i.r.p. aggregate spectral area density is calculated as follows:

$$10\log_{10}\ 1/A\sum_{i=1}^{N} e.i.r.p.(ai)\ \text{dBW/MHz-km}^2$$

where:

N = number of co-frequency hubs in BTA.

A = Area of BTA in km².

e.i.r.p. (ai) = equivalent isotropic radiated spectral power density of the i-th hub (in W/MHz) at elevation angle a where a is the angle in degrees of elevation above horizon. e.i.r.p.(0°) is the hub e.i.r.p. area density at the horizon used in Section 101.113c(2). The nominal antenna pattern will be used for elevation angles between 0° and 8°, and average levels will be used for angles beyond 8°, where average levels will be calculated by sampling the antenna patterns in each 1° interval between 8° and 9015, dividing by 83.

TABLE 2

Elevation angle (a)	Relative e.i.r.p. density (dBW/MHz-km²)

0° ≤a ≤4.0°	e.i.r.p.(a) = e.i.r.p.(0°) + 20 log (sinΠ x)(1/Π x) where x = (a + 1)/7.5°.
4.0° <a ≤7.7°	e.i.r.p.(a) = e.i.r.p.(0°) - 3.85a + 7.7.
a >7.7°	e.i.r.p.(a) = e.i.r.p.(0°) - 22.

(ii) LMDS system licensees in two or more BTAs may individually or collectively deviate from the spectral area density computed above by averaging the power over any 200 km by 400 km area, provided that the aggregate interference to the satellite receiver is no greater than if the spectral area density were as specified in Table 1. A showing to the Commission comparing both methods of computation is required and copies shall be served on any affected non-GSO MSS providers.

(4) *Power reduction techniques.* LMDS hub transmitters shall employ methods to reduce average power levels received by non-geostationary mobile satellite receivers, to the extent necessary to comply with paragraphs (c)(1) and (c)(2) of this section, by employing the methods set forth below:

(i) *Alternate polarizations.* LMDS hub transmitters in the LMDS service area may employ both vertical and horizontal linear polarizations such that 50 percent (plus or minus 10 percent) of the hub transmitters shall employ vertical polarization and 50 percent (plus or minus 10 percent) shall employ horizontal polarization.

(ii) *Frequency interleaving.* LMDS hub transmitters in the LMDS service area may employ frequency interleaving such that 50 percent (plus or minus 10 percent) of the hub transmitters shall employ channel center frequencies which are different by one-half the channel bandwidth of the other 50 percent (plus or minus 10 percent) of the hub transmitters.

(iii) *Alternative methods.* As alternatives to paragraphs (c)(4)(i) and (c)(4)(ii) of this section, LMDS operators may employ such other methods as may be shown to achieve equivalent reductions in average power density received by non-GSO MSS satellite receivers.

[61 FR 26677, May 28, 1996]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §101.113, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov.*

§101.115 Directional antennas.

(a) Unless otherwise authorized upon specific request by the applicant, each station authorized under the rules of this part must employ a directional antenna adjusted with the center of the major lobe of radiation in the horizontal plane directed toward the receiving station with which it communicates: *provided, however,* where a station communicates with more than one point, a multi- or omni-directional antenna may be authorized if necessary. New Periscope antenna systems will not, under ordinary circumstances, be authorized.

(b) Fixed stations (other than temporary fixed stations and DEMS nodal stations) operating at 932.5 MHz or higher must employ transmitting and receiving antennas (excluding second receiving antennas for operations such as space diversity) meeting the appropriate performance Standard A indicated below, except that in areas not subject to frequency congestion, antennas meeting performance Standard B may be used, subject to the requirements set forth in paragraph (d) of this section. For frequencies with a Standard B1 and a Standard B2, in order to comply with Standard B an antenna must fully meet either Standard B1 or Standard B2. Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

(1) With either the maximum beamwidth to 3 dB points requirement or with the minimum antenna gain requirement; and

(2) With the minimum radiation suppression to angle requirement.

ANTENNA STANDARDS

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points[1] (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
932.5 to 935	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
941.5 to 944	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
952 to 960[2] [3]	A	14.0	n/a	n/a	6	11	14	17	20	24
	B	20.0	n/a	n/a	n/a	6	10	13	15	20
1,850 to 2,500[4]	A	5.0	n/a	12	18	22	25	29	33	39
	B	8.0	n/a	5	18	20	20	25	28	36
3,700 to 4,200	A	2.7	36	23	29	33	36	42	55	55
	B	2.7	36	20	24	28	32	32	32	32
	B	2.2	38	21	25	29	32	35	39	45
5,925 to 6,425[5]	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
6,525 to 6,875[5]	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
6,875 to 7,125	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
10,550 to 10,680[7]	A	3.5	33.5	18	24	28	32	35	55	55
	B	3.5	33.5	17	24	28	32	35	40	45
10,565 to 10,615	n/a	360	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10,630 to 10,680[8]	n/a	3.5	34	20	24	28	32	35	36	36
10,700-11,700[5]	A	2.2	38	25	29	33	36	42	55	55
	B	3.5	33.5	17	24	28	32	35	40	45
12,200 to 13,250[9]	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 18,820	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	20	24	28	32	35	36	36
	B2	3.3	33.5	18	22	29	31	35	55	55
18,920 to	A	2.2	38	25	29	33	36	42	55	55

19,700[10]										
	B1	2.2	38	20	24	28	32	35	36	36
	B2	3.3	33.5	18	22	29	31	35	55	55
21,200 to 23,600[7 11]	A	3.3	33.5	18	26	26	33	33	55	55
	B1	3.3	33.5	17	24	24	29	29	40	50
	B2	4.5	30.5	14	19	22	24	29	52	52
24,250 to 25,250[10]	A	2.8	38	25	29	33	36	42	55	60
	B	2.8	38	20	24	28	32	35	36	45
31,000 to 31,300[12 13]	n/a	4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a
38,600 to 40,000[14]	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
71,000 to 76,000 (co-polar)[15]	N/A	1.2	43	35	40	45	50	50	55	55
71,000 to 76,000 (cross-polar)[15]	N/A	1.2	43	45	50	50	55	55	55	55
81,000 to 86,000 (co-polar)[15]	N/A	1.2	43	35	40	45	50	50	55	55
81,000 to 86,000 (cross-polar)[15]	N/A	1.2	43	45	50	50	55	55	55	55
92,000 to 95,000	N/A	0.6	50.0	36	40	45	50	55	55	55

[1]If a licensee chooses to show compliance using maximum beamwidth to 3 dB points, the beamwidth limit shall apply in both the azimuth and the elevation planes.

[2]Except for Multiple Address System frequencies listed in §§101.147(b)(1) through (b)(4), where omnidirectional antennas may be used.

[3]Antennas used at outlying stations as part of a central protection alarm system need conform to only the following 2 standards:

(i) The minimum on-beam forward gain must be at least 10 dBi, and

(ii) The minimum front-to-back ratio must be at least 20 dB.

[4]Omnidirectional antennas may be authorized in the band 2150-2160 MHz.

[5]These antenna standards apply to all point-to-point stations authorized after June 1, 1997. Existing licensees and pending applicants on that date are grandfathered and need not comply with these standards.

[6]These antenna standards apply to all point-to-point stations authorized on or before June 1, 1997.

[7]Except for antennas between 140° and 180° authorized or pending on January 1, 1989, in the band 10,550 to 10,565 MHz for which minimum radiation suppression to angle (in degrees) from centerline of main beam is 36 decibels.

[8]These antenna standards apply only to DEMS User Stations licensed, in operation, or applied for prior to July 15, 1993.

[9]Except for Temporary-fixed operations in the band 13200-13250 MHz with output powers less than 250 mW and as provided in §101.147(q)~~, and except for antennas in the MVDDS service in the band 12.2-12.7 GHz~~.

[10]DEMS User Station antennas in this band must meet performance Standard B and have a minimum antenna gain of 34 dBi. The maximum beamwidth requirement does not apply to DEMS User Stations. DEMS Nodal Stations need not comply with these standards. Stations authorized to operate in the 24,250-25,250 MHz band do not have to meet these standards, however, the Commission may require the use of higher performance antennas where interference problems can be resolved by the use of such antennas.

[11]Except as provided in §101.147(s).

[12]The minimum front-to-back ratio shall be 38 dBi.

[13]Mobile, except aeronautical mobile, stations need not comply with these standards.

[14]Stations authorized to operate in the 38,600-40,000 MHz band may use antennas other than those meeting the Category A standard. However, the Commission may require the use of higher performance antennas where interference problems can be resolved by the use of such antennas.

[15]Antenna gain less than 50 dBi (but greater than or equal to 43 dBi) is permitted only with a proportional reduction in maximum authorized EIRP in a ratio of 2 dB of power per 1 dB of gain, so that the maximum allowable EIRP (in dBW) for antennas of less than 50 dBi gain becomes + 55−2(50-G), where G is the antenna gain in dBi. In addition, antennas in these bands must meet two additional standards for minimum radiation suppression: At angles between 1.2 and 5 degrees from the centerline of the main beam, co-polar discrimination must be G−28, where G is the antenna gain in dBi; and at angles of less than 5 degrees from the centerline of main beam, cross-polar discrimination must be at least 25 dB.

(c) The Commission shall require the replacement of any antenna or periscope antenna system of a permanent fixed station operating at 932.5 MHz or higher that does not meet performance Standard A specified in paragraph (c) of this section, at the expense of the licensee operating such antenna, upon a showing that said antenna causes or is likely to cause interference to (or receive interference from) any other authorized or applied for station whereas a higher performance antenna is not likely to involve such interference. Antenna performance is expected to meet the standards of paragraph (c) of this section for parallel polarization. For cases of potential interference, an antenna will not be considered to meet Standard A unless the parallel polarization performance for the discrimination angle involved meets the requirements, even if the cross-polarization performance controls the interference.

(d) In cases where passive reflectors are employed in conjunction with transmitting antenna systems, the foregoing paragraphs of this section also will be applicable. However, in such instances, the center of the major lobe of radiation from the antenna normally must be directed at the passive reflector, and the center of the major lobe of radiation from the passive reflector directed toward the receiving station with which it communicates.

(e) Periscope antennas used at an electric power facility plant area will be excluded from the requirements of paragraph (c) of this section on a case-by-case basis where technical considerations or safety preclude the use of other types of antenna systems.

(f) In the 10,700-11,700 MHz band, a fixed station may employ transmitting and receiving antennas meeting performance standard B in any area. If a Fixed Service or Fixed Satellite Service licensee or applicant makes a showing that it is likely to receive interference from such fixed station and that such interference would not exist if the fixed station used an antenna meeting performance standard A, the fixed station licensee must modify its use. Specifically, the fixed station licensee must either substitute an antenna meeting performance standard A or operate its system with an EIRP reduced so as not to radiate, in the direction of the other licensee, an EIRP in excess of that which would be radiated by a station using a Category A antenna and operating with the maximum EIRP allowed by the rules. A licensee or prior applicant using an antenna that does not meet performance Standard A may object to a prior coordination notice based on interference only if such interference would be predicted to exist if the licensee or prior applicant used an antenna meeting performance standard A.

(g) In the event harmful interference is caused to the operation of other stations, the Commission may, after notice and opportunity for hearing, order changes to be made in the height, orientation, gain and radiation pattern of the antenna system.

[61 FR 26677, May 28, 1996, as amended at 62 FR 4924, Feb. 3, 1997; 62 FR 24582, May 6, 1997; 63 FR 6105, Feb. 6, 1998; 65 FR 38329, June 20, 2000; 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4957, Jan. 31, 2003; 69 FR 3267, Jan. 23, 2004; 70 FR 29997, May 25, 2005; 72 FR 55677, Oct. 1, 2007; 73 FR 55775, Sept. 26, 2008; 76 FR 59572, Sept. 27, 2011; 77 FR 54432, Sept. 5, 2012; 77 FR 73957, Dec. 12, 2012]

§101.117 Antenna polarization.

Except as set forth herein, stations operating in the radio services included in this part are not limited as to the type of polarization of the radiated signal that may be employed. However, in the event interference in excess of permissible levels is caused to the operation of other stations as a result of employing other than linear polarization, the Commission may order a licensee to change its system polarization to mitigate the interference. No change in polarization may be made without prior authorization from the Commission. Unless otherwise allowed, only linear polarization (horizontal and vertical) shall be used. For LMDS systems, unless otherwise authorized, system operators are permitted to use any polarization within its service area, but only vertical and/or horizontal polarization for antennas located within 20 kilometers of the outermost edge of their service area.

[68 FR 4957, Jan. 31, 2003]

§101.119 Simultaneous use of common antenna structures.

The simultaneous use of common antenna structures by more than one radio station, or by one of more domestic public radio stations and one or more stations of any other class or service, may be authorized: provided, however, that each licensee or user of any such structure is responsible for maintaining the structure, and for painting and illuminating the structure when obstruction marking is required by the Commission. (See §101.21(a).)

§101.125 Temporary fixed antenna height restrictions.

The overall antenna structure heights employed by mobile stations in the Local Television Transmission Service and by stations authorized to operate at temporary fixed locations may not exceed the height criteria set forth in §17.7 of this chapter, unless in each instance, authorization for use of a specific maximum antenna height (above ground and above mean sea level) for each location has been obtained from the Commission prior to erection of the antenna. Requests for such authorization must

show the inclusive dates of the proposed operation. (Complete information as to rules concerning the construction, marking and lighting of antenna structures is contained in part 17 of this chapter.)

§101.129 Transmitter location.

(a) The applicant must determine, prior to filing an application for a radio station authorization, that the antenna site specified therein is adequate to render the service proposed. In cases of questionable antenna locations, it is desirable to conduct propagation tests to indicate the field intensity which may be expected in the principal areas or at the fixed points of communication to be served, particularly where severe shadow problems may be expected. In considering applications proposing the use of such locations, the Commission may require site survey tests to be made pursuant to an experimental license under part 5 of this chapter. In such cases, propagation tests should be conducted in accordance with recognized engineering methods and should be made with a transmitting antenna simulating, as near as possible, the proposed antenna installation. Full data obtained from such surveys and its analysis, including a description of the methods used and the name, address and qualifications of the engineer making the survey, must be supplied to the Commission.

(b) [Reserved]

~~(b) In the 12.2-12.7 GHz band, licensees must not locate MVDDS transmitting antennas within 10 km of any qualifying NGSO FSS receiver unless mutual agreement is obtained between the MVDDS and NGSO FSS licensees. Such agreements must be retained by the licensees and made available for inspection by interested parties upon request.~~

~~(1) A qualifying NGSO FSS receiver, for the purposes of this section, is deemed to be one that is in regular use by an NGSO FSS subscriber for normal reception purposes in the 12.2-12.7 GHz band and not one for monitoring or testing purposes. In addition, qualifying receivers must either be in operation on the date or already be under construction and then operating within thirty days of the date that the MVDDS licensee notifies the NGSO FSS licensee of its intent to construct a new MVDDS transmitting antenna at a specified location.~~

~~(2) Except as provided in paragraph (b)(3) of this section, the 10 kilometer spacing requirement for each MVDDS transmitting antenna site shall not apply with respect to NGSO FSS receivers that might be installed or become operational (except for those under construction and operating within thirty days as specified in paragraph (b)(1) of this section) subsequent to the original date that the MVDDS licensee provided notice of its intention to construct a given transmission facility.~~

~~(3) In the event that a proposed MVDDS transmitting antenna for which notice has been duly given to the NGSO FSS licensees has not been placed in normal operation within one calendar year of the date of notice, then the MVDDS licensee loses the benefit of the original notice. Upon such anniversary, the MVDDS licensee must re-determine compliance with the minimum 10 kilometer spacing requirement based upon locations of qualifying NGSO FSS receivers on that anniversary date. A new determination of compliance with the spacing requirement shall be made for each succeeding anniversary of non-operation for each proposed MVDDS transmission site or additional antenna. This provision contemplates that failure to commence normal operation at a given MVDDS transmitting antenna site within one year of the date of NGSO FSS notification may require successive relocations of the proposed transmitter site in order to meet the minimum spacing distance as determined on each anniversary of non-operation.~~

[61 FR 26677, May 28, 1996, as amended at 63 FR 68983, Dec. 14, 1998; 67 FR 43038, June 26, 2002; 78 FR 25176, Apr. 29, 2013]

§101.131 Transmitter construction and installation.

(a) The equipment at the operating and transmitting positions must be so installed and protected that it is not accessible to, or capable of being operated by, persons other than those duly authorized by the licensee.

(b) In any case where the maximum modulating frequency of a transmitter is prescribed by the Commission, the transmitter must be equipped with a low-pass or band-pass modulation filter of suitable performance characteristics. In those cases where a modulation limiter is employed, the modulation filter must be installed between the transmitter stage in which limiting is effected and the modulated stage of the transmitter.

(c) Each transmitter employed in these services must be equipped with an appropriately labeled pilot lamp or meter which will provide continuous visual indication at the transmitter when its control circuits have been placed in a condition to activate the transmitter. In addition, facilities must be provided at each transmitter to permit the transmitter to be turned on and off independently of any remote control circuits associated therewith.

(d) At each transmitter control point the following facilities must be installed:

(1) A carrier operated device which will provide continuous visual indication when the transmitter is radiating, or, in lieu thereof, a pilot lamp or meter which will provide continuous visual indication when the transmitter control circuits have been placed in a condition to activate the transmitter; and

(2) Facilities which will permit the operator to turn transmitter carrier on and off at will.

(e) Transmitter control circuits from any control point must be so installed that grounding or shorting any line in the control circuit will not cause the transmitter to radiate: provided, however, That this provision will not be applicable to control circuits of stations which normally operate with continuous radiation or to control circuits which are under the effective operational control of responsible operating personnel 24 hours per day.

§101.133 Limitations on use of transmitters.

(a) Transmitters licensed for operation in Common Carrier services may be concurrently licensed or used for non-common carrier communication purposes. Mobile units may be concurrently licensed or used for non-common carrier communication purposes provided that the transmitter is certificated for use in each service.

(b) Private operational fixed point-to-point microwave stations authorized in this service may communicate with associated operational-fixed stations and fixed receivers and with units of associated stations in the mobile service licensed under Private Radio Service rule parts. In addition, intercommunication is permitted with other licensed stations and with U.S. Government stations in those cases which require cooperation or coordination of activities or when cooperative use arrangements in accordance with §101.135 are contemplated; provided, however, that where communication is desired with stations authorized to operate under the authority of a foreign jurisdiction, prior approval of this Commission must be obtained; And provided further, That the authority under which such other stations operate does not prohibit the intercommunication.

(c) Two or more persons or governmental entities eligible for private operational fixed point-to-point microwave licenses may use the same transmitting equipment under the following terms and conditions:

(1) Each licensee complies with the general operating requirements set out in this part;

(2) Each licensee is eligible for the frequency(ies) on which the facility operates; and

(3) Each licensee must have the ability to access the transmitter(s) that it is authorized to operate under the multiple licensing arrangement.

(d) *LMDS subscriber transmissions.* LMDS licensees shall not operate transmitters from subscriber locations in the 29.1-29.25 GHz band.

(e) Existing private operational fixed wireless licensees applying to become common carrier wireless licensees shall comply with all provisions of the Communications Act and the Commission's rules. Applicants must take all required filings, including FCC Form 601, and receive all necessary Commission approval prior to operating as a common carrier wireless licensee. The regulatory fee associated with FCC wireless application Form 601 is waived for applicants who are existing private operational fixed licensees seeking common carrier status, provided that such licensees have also complied with all other discontinuance requirements of Title II of the Act. Applicants are responsible for all other Commission regulatory fees.

[61 FR 26677, May 28, 1996, as amended at 61 FR 44183, Aug. 28, 1996; 63 FR 36611, July 7, 1998; 68 FR 4957, Jan. 31, 2003]

§101.135 Shared use of radio stations and the offering of private carrier service.

Licensees of Private Operational Fixed Point-to-Point Microwave radio stations may share the use of their facilities on a non-profit basis or may offer service on a for-profit private carrier basis, subject to the following conditions and limitations:

(a) Persons or governmental entities licensed to operate radio systems pursuant to subpart H of this part on any of the private radio frequencies set out in §101.101 may share such systems with, or provide private carrier service to, any eligible entity for licensing under this part, regardless of individual eligibility restrictions, provided that the communications being carried are permissible under §101.603.

(b) The licensee must maintain access to and control over all facilities authorized under its license;

(c) All sharing and private carrier arrangements must be conducted pursuant to a written agreement to be kept as part of the station records; and

(d) The licensee must keep an up-to-date list of system sharers and private carrier subscribers and the basis of their eligibility under this part. Such records must be kept current and must be made available upon request for inspection by the Commission.

(e) Applicants licensed in the MAS frequencies after June 2, 2000, shall not provide service to others on a for-profit private carrier basis in the 928-928.85/952-952.85/956.25-956.45 MHz bands and the 932.25-932.5/941.25-941.5 MHz bands.

[61 FR 26677, May 28, 1996, as amended at 65 FR 17449, Apr. 3, 2000; 65 FR 38330, June 20, 2000; 66 FR 35110, July 3, 2001; 68 FR 4958, Jan. 31, 2003]

§101.137 Interconnection of private operational fixed point-to-point microwave stations.

Private operational fixed point-to-point microwave stations may be interconnected with facilities of common carriers subject to applicable tariffs.

§101.139 Authorization of transmitters.

(a) Unless specified otherwise, transmitters used in the private operational fixed and common carrier fixed point-to-point microwave and point-to-multipoint services under this part must be a type that has been verified for compliance.

(b) Any manufacturer of a transmitter to be produced for use under the rules of this part may request certification or obtain verification by following the applicable procedures set forth in part 2 of this chapter.

(c) Certification for an individual transmitter may also be requested by an applicant for a station authorization, pursuant to the procedures set forth in part 2 of this chapter.

(d) A transmitter presently shown on an instrument of authorization, which operates on an assigned frequency in the 890-940 MHz band and has not been certificated, may continue to be used by the licensee without certification provided such transmitter continues otherwise to comply with the applicable rules and regulations of the Commission.

(e) Certification or verification is not required for portable transmitters operating with peak output power not greater than 250 mW. If operation of such equipment causes harmful interference the FCC may, at its discretion, require the licensee to take such corrective action as is necessary to eliminate the interference.

(f) After July 15, 1996, the manufacturer (except for export) or importation of equipment employing digital modulation techniques in the 3700-4200, 5925-6425, 6525-6875, 10,550-10,680 and 10,700-11,700 MHz bands must meet the minimum payload capacity requirements of §101.141.

(g) After April 1, 2005, the manufacture (except for export) or importation of equipment for operation in the 21,200-23,600 MHz band must meet:

(1) The 0.001% frequency tolerance requirement for digital systems in §101.107(a) or the 0.03-0.003% frequency tolerance for analog sytems; and

(2) For equipment employing digital modulation techniques, the minimum bit rate requirements of §101.141(a).

(h) *71,000-76,000 MHz; 81,000-86,000 MHz.* For equipment employing digital modulation techniques, the minimum bit rate requirement is 0.125 bit per second per Hz.

(i) *92,000-94,000 MHz; 94,100-95,000 MHz.* For equipment employing digital modulation techniques, the minimum bit rate requirement is 1.0 bit per second per Hz.

[63 FR 36611, July 7, 1998, as amended at 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4958, Jan. 31, 2003; 70 FR 29998, May 25, 2005]

§101.141 Microwave modulation.

(a) Microwave transmitters employing digital modulation techniques and operating below 25.25 GHz ~~(except for MVDDS stations in the 12,200-12,700 MHz band)~~ must, with appropriate multiplex equipment, comply with the following additional requirements:

(1) The bit rate, in bits per second, must be equal to or greater than the bandwidth specified by the emission designator in Hertz (*e.g.,* to be acceptable, equipment transmitting at a 20 Mb/s rate must not

require a bandwidth of greater than 20 MHz), except the bandwidth used to calculate the minimum rate may not include any authorized guard band.

(i) Stations authorized prior to December 1, 1988 may install equipment after that date with no minimum bit rate. Equipment applied for or authorized prior to April 1, 2005 in the 21.2-23.6 GHz band may be installed with no minimum bit rate.

(ii) However, any digital equipment applied for after April 1, 2005 and equipment replacing existing equipment in the 21.2-23.6 GHz band must meet the bit rate standard.

(2) Equipment to be used for voice transmission placed in service, authorized, or applied for on or before June 1, 1997 in the 2110 to 2130 and 2160 to 2180 MHz bands must be capable of satisfactory operation within the authorized bandwidth to encode at least 96 voice channels. Equipment placed in service, authorized, or applied for on or before June 1, 1997 in the 3700-4200, 5925-6425 (30 MHz bandwidth), and 10,700-11,700 MHz (30 and 40 MHz bandwidths) bands must be capable of satisfactory operation within the authorized bandwidth to encode at least 1152 voice channels. These required loading levels may be reduced by a factor of 1/N provided that N transmitters may be operated satisfactorily, over the same radio path, within an authorized bandwidth less than, or equal to, the maximum authorizable bandwidth (*e.g.,* the 1152 channel requirement may be reduced to 576 if two transmitters can be satisfactorily operated over the same path within the maximum bandwidth). Where certificated equipment is designed to operate on the same frequency in a cross polarized configuration to meet the above capacity requirements, the Commission will require, at the time additional transmitters are authorized, that both polarizations of a frequency be used before a new frequency assignment is made, unless a single transmitter installation was found to be justified by the Commission at the time it authorized the first transmitter.

(3)(i) Except as noted in paragraph (a)(7) of this section, the payload capacity of equipment shall meet the following minimum efficiency standards:

Frequency	Emission bandwidth ≤5 MHz	Emission bandwidth >5 MHz and ≤20 MHz	Emission bandwidth >20 MHz
3,700-10,550 MHz	2.4 bits/second/Hertz	4.4 bits/second/Hertz	4.4 bits/second/Hertz.
10,550-13,250 MHz	2.4 bits/second/Hertz	4.4 bits/second/Hertz	3.0 bits/second/Hertz.

(ii) Traffic loading payload shall exceed 50 percent of payload capacity within 30 months of licensing. During anomalous signal fading, licensees subject to the capacity and loading requirements may adjust to a modulation specified in their authorization if such modulation is necessary to allow licensees to maintain communications, even if the modulation will not comply with the capacity and loading requirements specified in this paragraph. Links that must comply with the capacity and loading requirements that use equipment capable of adjusting modulation must be designed using generally accepted multipath fading and rain fading models to meet the specified capacity and loading requirements at least 99.95% of the time, in the aggregate of both directions in a two-way link.

(4) If a transmitter is authorized to operate in a bandwidth that is not listed in paragraph (a)(3) of this section, it must meet the minimum payload capacity and traffic loading requirements of the next largest channel bandwidth listed in the table; *e.g.,* if the authorized bandwidth is 3.5 MHz, the minimum payload capacity must be 12.3 Mbits/s.

(5) Transmitters carrying digital motion video motion material are exempt from the requirements specified in paragraphs (a)(2) and (a)(3) of this section, provided that at least 50 percent of the payload is digital video motion material and the minimum bit rate specified in paragraph (a)(1) of this section is met. In the 6, 10, and 11 GHz bands, concatenation of multiple contiguous channels is permitted for

channels of equal bandwidth on center frequencies, provided no other channels are available and the minimum payload capacity requirements are met.

(6) Digital systems using bandwidths of 10 MHz or larger will be considered 50 percent loaded when at least 50 percent of their total capacity is being used. For purposes of this subsection, a Fixed Service channel is being used if it is attached to a communications system that is capable of providing data to it at a rate that is sufficient to occupy at least 50 percent of the payload capacity of the Fixed Service channel, after header compression is applied.

(7) Equipment placed in service after June 1, 1997 and prior to October 5, 2012 may comply with the provisions of §101.141(a)(3) in effect as of the date the equipment was placed in service.

(b) For purposes of compliance with the emission limitation requirements of §101.111(a)(2) and the requirements of paragraph (a) of this section, digital modulation techniques are considered as being employed when digital modulation occupies 50 percent or more to the total peak frequency deviation of a transmitted radio frequency carrier. The total peak frequency deviation will be determined by adding the deviation produced by the digital modulation signal and the deviation produced by any frequency division multiplex (FDM) modulation used. The deviation (D) produced by the FDM signal must be determined in accordance with §2.202(f) of this chapter.

(c) Analog Modulation. Except for video transmission, an application for an initial working channel for a given route will not be accepted for filing where the anticipated loading (within five years for voice, or other period subject to reasonable projection) is less than the minimum specified for the following frequency bands. Absent extraordinary circumstances, applications proposing additional frequencies over existing routes will not be granted unless it is shown that the traffic load will shortly exhaust the capacity of the existing equipment. Where no construction of radio facilities is requested, licensees must submit this evidence with their filing of any necessary authority required pursuant to section 214 of the Communications Act and part 63 of this chapter.

Frequency band (MHz)	**Minimum number of voice channels (4 KHz or equivalent)**
3700 to 4200 (20 MHz bandwidth)	900
5925 to 6425 (10 MHz bandwidth)	300
5925 to 6425 (20 MHz bandwidth)	600
5925 to 6425 (30 MHz bandwidth)	900
6525 to 6875 (10 MHz bandwidth)	300
10,700 to 11,700 (10 MHz bandwidth)	300
10,700 to 11,700 (20 MHz bandwidth)	600
10,700 to 11,700 (30 MHz bandwidth)	900
10,700 to 11,700 (40 MHz bandwidth)	900

[61 FR 26677, May 28, 1996, as amended at 62 FR 24583, May 6, 1997; 63 FR 36611, July 7, 1998; 65 FR 59358, Oct. 5, 2000; 67 FR 43039, June 26, 2002; 68 FR 4958, Jan. 31, 2003; 76 FR 59572, Sept. 27, 2011; 77 FR 54433, Sept. 5, 2012]

§101.143 Minimum path length requirements.

(a) The distance between end points of a fixed link in the private operational fixed point-to-point and the common carrier fixed point-to-point microwave services must equal or exceed the value set forth in the table below or the EIRP must be reduced in accordance with the equation set forth below:

Frequency band (MHz)	**Minimum path length (km)**
Below 1,850	N/A
1,850 to 7,125	17
10,550 to 13,250	5

Above 17,700	N/A

(b) For paths shorter than those specified in the table in paragraph (a) of this section, the EIRP shall not exceed the value derived from the following equation:

EIRP = MAXEIRP-40*log(A/B) dBW

Where: EIRP = The new maximum EIRP (equivalent isotropically radiated power) in dBW. MAXEIRP = Maximum EIRP as set forth in the Table in Section 101.113(a).

A = Minimum path length from the Table above for the frequency band in kilometers.

B = The actual path length in kilometers.

NOTE TO PARAGRAPH (B): For transmitters using Automatic Transmitter Power Control, EIRP corresponds to the maximum transmitter power available, not the coordinated transmit power or the nominal transmit power.

(c) Upon an appropriate technical showing, applicants and licensees unable to meet the minimum path length requirement may be granted an exception to these requirements.

NOTE TO PARAGRAPH (C): Links authorized prior to April 1, 1987, need not comply with this requirement.

[61 FR 26677, May 28, 1996, as amended at 65 FR 38330, June 20, 2000]

§101.145 Interference to geostationary-satellites.

These limitations are necessary to minimize the probability of harmful interference to reception in the bands 2655-2690 MHz, 5925-7075 MHz, and 12.7-13.25 GHz on board geostationary-space stations in the fixed-satellite service.

(a) Stations authorized prior to July 1, 1976 in the band 2655-2690 MHz, which exceed the power levels in paragraphs (b) and (c) of this section are permitted to operate indefinitely, provided that the operation of such stations does not result in harmful interference to reception in these bands on board geostationary space stations.

(b) *2655 to 2690 MHz and 5925 to 7075 MHz.* No directional transmitting antenna utilized by a fixed station operating in these bands with EIRP greater than 35 dBW may be aimed within 2 degrees of the geostationary-satellite orbit, taking into account atmospheric refraction. However, exception may be made in unusual circumstances upon a showing that there is no reasonable alternative to the transmission path proposed. If there is no evidence that such exception would cause possible harmful interference to an authorized satellite system, said transmission path may be authorized on waiver basis where the maximum value of the equivalent isotropically radiated power (EIRP) does not exceed:

(1) + 47 dBW for any antenna beam directed within 0.5 degrees of the stationary satellite orbit; or

(2) + 47 to + 55 dBW, on a linear decibel scale (8 dB per degree) for any antenna beam directed between 0.5 degrees and 1.5 degrees of the stationary orbit.

(c) *12.7 to 13.25 GHz.* No directional transmitting antenna utilized by a fixed station operating in this band with EIRP greater than 45 dBW may be aimed within 1.5 degrees of the geostationary-satellite orbit, taking into account atmospheric refraction.

(d) Methods for calculating the azimuths to be avoided may be found in: CCIR Report No. 393 (Green Books), New Delhi, 1970; in “Radio-Relay Antenna Pointing for controlled Interference With Geostationary-Satellites” by C. W. Lundgren and A. S. May, Bell System Technical Journal, Vol. 48, No.

10, pp. 3387-3422, December 1969; and in “Geostationary Orbit Avoidance Computer Program” by Richard G. Gould, Common Carrier Bureau Report CC-7201, FCC, Washington, DC, 1972. This latter report is available through the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22151, in printed form (PB-211 500) or source card deck (PB-211 501).

[61 FR 26677, May 28, 1996, as amended at 65 FR 38330, June 20, 2000; 68 FR 12777, Mar. 17, 2003; 77 FR 54433, Sept. 5, 2012]

§101.147 Frequency assignments.

(a) Frequencies in the following bands are available for assignment for fixed microwave services.

928.0-929.0 MHz (28)

932.0-932.5 MHz (27)

932.5-935 MHz (17)

941.0-941.5 MHz (27)

941.5-944 MHz (17) (18)

952.0-960.0 MHz (28)

1,850-1,990 MHz (20) (22)

2,110-2,130 MHz) (1) (3) (7) (20) (23)

2,130-2,150 MHz (20) (22)

2,160-2,180 MHz (1) (2) (20) (23)

2,180-2,200 MHz (20) (22)

2,450-2,500 MHz (12)

2,650-2,690 MHz

3,700-4,200 MHz (8) (14) (25)

5,925-6,425 MHz (6) (14) (25)

6,425-6,525 MHz (24)

6,525-6.875 MHz (14) (33)

6,875-7,125 MHz (10), (34)

10,550-10,680 MHz (19)

10,700-11,700 MHz (8) (9) (19) (25)

11,700-12,200 MHz (24)

12,200-12,700 MHz (31)

12,700-13,200 (22), (34)

13,200-13,250 MHz (4) (24) (25)

14,200-14,400 MHz (24)

17,700-18,820 MHz (5) (10) (15)

17,700-18,300 MHz (10) (15)

18,820-18,920 MHz (22)

18,300-18,580 MHz (5) (10) (15)

18,580-19,300 MHz (22) (30)

18,920-19,160 MHz (5 (10) (15)

19,160-19,260 MHz (22)

19,260-19,700 MHz (5) (10) (15)

19,300-19,700 MHz (5) (10) (15)

21,200-22,000 MHz (4) (11) (12) (13) (24) (25) (26)

22,000-23,600 MHz (4) (11) (12) (24) (25) (26)

24,250-25,250 MHz

27,500-28,350 MHz (16)

29,100-29,250 MHz (5), (16)

31,000-31,300 MHz (16)

37,000-40,000 MHz (4)(32)

42,000-42,500 MHz

71,000-76,000 MHz (5) (17)

81,000-86,000 MHz (5) (17)

92,000-94,000 MHz (17)

94,100-95,000 MHz (17)

Notes

(1) Frequencies in this band are shared with control and repeater stations in the Public Mobile Services and with stations in the International Fixed Public Radio communication Services located south of 25°30' north latitude in the State of Florida and U. S. possessions in the Caribbean area. Additionally, the band 2160-2162 MHz is shared with stations in the Multipoint Distribution Service.

(2) Except upon showing that no alternative frequencies are available, no new assignments will be made in the band 2160-2162 MHz for stations located within 80.5 kilometers (50 miles) of the coordinates of the cities listed in §21.901(c) of this chapter.

(3) Television transmission in this band is not authorized and radio frequency channel widths may not exceed 3.5 MHz.

(4) Frequencies in this band are shared with fixed and mobile stations licensed in other services.

(5) Frequencies in this band are shared with stations in the fixed-satellite service.

(6) These frequencies are not available for assignment to mobile earth stations.

(7) Frequencies in the band 2110-2120 MHz may be authorized on a case-by-case basis to Government or non-Government space research earth stations for telecommand purposes in connection with deep space research.

(8) This frequency band is shared with station(s) in the Local Television Transmission Service and, in the U.S. Possessions in the Caribbean area, with stations in the International Fixed Public Radiocommunications Services.

(9) The band segments 10.95-11.2 and 11.45-11.7 GHz are shared with space stations (space to earth) in the fixed-satellite service.

(10) This band is co-equally shared with stations in the fixed services under parts 74, 78 and 101 of this chapter.

(11) Frequencies in this band are shared with Government stations.

(12) Frequencies in this band are available for assignment to the common carrier and private-operational fixed point-to-point microwave services.

(13) Frequencies in this band are shared with stations in the earth exploration satellite service (space to earth).

(14) Frequencies in this band are shared with stations in the fixed-satellite service.

(15) Stations licensed as of September 9, 1983 to use frequencies in the 17.7-19.7 GHz band may, upon proper application, continue to be authorized for such operation.

(16) As of June 30, 1997, frequencies in these bands are available for assignment only to LMDS radio stations, except for non-LMDS radio stations authorized pursuant to applications refiled no later than June 26, 1998.

(17) Frequencies in these bands are shared with Government fixed stations and stations in the Private Operational Fixed Point-to-Point Microwave Service (part 101).

(18) Frequencies in the 942 to 944 MHz band are also shared with broadcast auxiliary stations.

(19) Frequencies in this band are shared with stations in the private-operational fixed point-to-point microwave service.

(20) New facilities in these bands will be licensed only on a secondary basis. Facilities licensed or applied for before January 16, 1992, are permitted to make minor modifications in accordance with §101.81 and retain their primary status.

(21) Any authorization of additional stations to use the 2160-2162 MHz band for Multipoint Distribution Service applied for after January 16, 1992, will be secondary to use of the band for emerging technology services.

(22) Frequencies in these bands are for the exclusive use of Private Operational Fixed Point-to-Point Microwave Service (part 101). Frequencies in the 12,700-13,200 MHz band, which were available only to stations authorized in the 12,200-12,700 MHz band as of September 9, 1983, are not available for new facilities.

(23) Frequencies in these bands are for the exclusive use of Common Carrier Fixed Point-to-Point Microwave Service (part 101).

(24) Frequencies in these bands are available for assignment to television pickup and television non-broadcast pickup stations. The maximum power for the local television transmission service in the 14.2-14.4 GHz

band is + 45 dBW except that operations are not permitted within 1.5 degrees of the geostationary orbit. Beginning March 1, 2005, no new LTTS operators will be licensed and no existing LTTS licenses shall be issued in the 11.7-12.2 and 14.2-14.4 GHz bands.

(25) Frequencies in these bands are available for assignment to television STL stations.

(26) Frequencies from 21.8-22.0 GHz and 23.0-23.2 GHz may be authorized for low power, limited coverage systems subject to the provisions of paragraph (s)(8) of this section.

(27) Frequencies in the 932 to 932.5 MHz and 941 to 941.5 MHz bands are shared with Government fixed point-to-multipoint stations. Frequencies in these bands are paired with one another and are available for flexible use for transmission of the licensee's products and information services, excluding video entertainment material. 932.00625/941.00625 MHz to 932.24375/941.24375 MHz is licensed by Economic Area. 932.25625/941.25625 MHz to 932.49375/941.49375 MHz is licensed on a site-by-site basis.

(28) Licensees that obtain authorizations in the 928/952/956 MHz MAS bands subsequent to July 1, 1999 are limited to private internal services, as defined in §101.1305. Incumbent operations in the 928/952/956 MHz MAS bands, as defined in §101.1331(a), are subject to grandfather rights pursuant to §101.1331. The 928.85-929.0 MHz and 959.85-960.0 MHz bands are licensed on a geographic area basis with no eligibility restrictions. The 928.0-928.85 MHz band paired with the 952.0-952.85 MHz band, in addition to unpaired frequencies in the 956.25-956.45 MHz band, are licensed on a site-by-site basis and used for terrestrial point-to-point and point-to-multipoint fixed and limited mobile operations. The 928.85-929.0 MHz band paired with the 959.85-960.0 MHz band is licensed by Economic Area and used for terrestrial point-to-point and point-to-multipoint fixed operations.

(29) Frequencies in this band are shared with stations in the Multipoint Distribution Service (part 21). These frequencies may be used for the transmission of the licensee's products and information services, excluding video entertainment material to the licensee's customers.

(30) The frequency band 18,580-19,300 GHz is not available for new licensees after June 8, 2000, except for low power indoor stations in the band 18,820-18,870 MHz and 19,160-19,210 MHz.

(31) This frequency band can be used for ~~Multichannel Video Distribution and Data~~Lower Microwave Flexible Use Service (~~MVDDS~~LMFUS) shared with Direct Broadcast Satellite (DBS) Services on a co-primary non-harmful interference basis~~ and on a co-primary basis with NGSO FSS satellite earth stations~~. Incumbent private operational fixed point-to-point licensees can also use these frequencies on a site by site basis.

(32) Frequencies in this band are shared with stations in the fixed-satellite service, subject to the conditions specified in footnote 15 of §25.202(a)(1) of this chapter, see 47 CFR 47 25.202(a)(1) n.16.

(33) The coordination of a new 30 megahertz link in the 6,525-6,875 MHz band should be attempted only if it cannot be accommodated in the 5,925-6,425 MHz band.

(34) In the bands 6,875-7,125 MHz and 12,700-13,150 MHz, links shall not intersect with the service areas of television pickup stations.

(b) Frequencies normally available for assignment in this service are set forth with applicable limitations in the following tables: 928-960 MHz Multiple address system (MAS) frequencies are available for the point-to-multipoint and point-to-point transmission of a licensee's products or services, excluding video entertainment material, to a licensee's customer or for its own internal communications. The paired frequencies listed in this section are used for two-way communications between a master station and remote stations. Ancillary one-way communications on paired frequencies are permitted on a case-by-case basis. Ancillary communications between interrelated master stations are permitted on a secondary basis. The normal channel bandwidth assigned will be 12.5 kHz. EA licensees, however, may combine contiguous channels without limit or justification. Site-based licensees may combine contiguous channels up to 50 kHz, and more than 50 kHz only upon a showing of adequate justification. Any bandwidth (12.5 kHz, 25 kHz or greater) authorized in accordance with this section may be subdivided into narrower bandwidths to create additional (or sub) frequencies without the need to specify each

discrete frequency within the specific bandwidth. Equipment that is used to create additional frequencies by narrowing bandwidth (whether authorized for a 12.5 kHz, 25 kHz or greater bandwidth) will be required to meet, at a minimum, the ±0.00015 percent tolerance requirement so that all subfrequencies will be within the emission mask. Systems licensed for frequencies in these MAS bands prior to August 1, 1975, may continue to operate as authorized until June 11, 1996, at which time they must comply with current MAS operations based on the 12.5 kHz channelization set forth in this paragraph. Systems licensed between August 1, 1975, and January 1, 1981, inclusive, are required to comply with the grandfathered 25 kHz standard bandwidth and channelization requirements set forth in this paragraph. Systems originally licensed after January 1, 1981, and on or before May 11, 1988, with bandwidths of 25 kHz and above, will be grandfathered indefinitely.

NOTE TO PARAGRAPH (B) INTRODUCTORY TEXT: Paragraphs (b)(1) through (b)(5) and Tables 1 through 7 of this section pertain to Multiple Address System (MAS) frequencies and paragraph (b)(6) and Tables 8 through 11 of this section pertain to Point-To-Point frequencies.

(1) Frequencies listed in this paragraph are designated for private internal use and are subject to site-based licensing.

TABLE 1—PAIRED FREQUENCIES (MHZ)

[12.5 kHz bandwidth]

Remote transmit	Master transmit
928.00625	952.00625
928.01875	952.01875
928.03125	952.03125
928.04375	952.04375
928.05625	952.05625
928.06875	952.06875
928.08125	952.08125
928.09375	952.09375
928.10625	952.10625
928.11875	952.11875
928.13125	952.13125
928.14375	952.14375
928.15625	952.15625
928.16875	952.16875
928.18125	952.18125
928.19375	952.19375
928.20625	952.20625
928.21875	952.21875
928.23125	952.23125
928.24375	952.24375
928.25625	952.25625
928.26875	952.26875
928.28125	952.28125
928.29375	952.29375
928.30625	952.30625
928.31875	952.31875
928.33125	952.33125
928.34375	952.34375

UNPAIRED FREQUENCIES (MHZ)

[12.5 kHz bandwidth]

D	D	D
956.25625	956.33125	956.39375
956.26875	956.34375	956.40625
956.28125	956.35625	956.41875
956.29375	956.36875	956.43125
956.30625	956.38125	956.44375
956.31875		

TABLE 2—PAIRED FREQUENCIES (MHZ)

[25 kHz bandwidth]

Remote transmit	Master transmit
928.0125	952.0125
928.0375	952.0375
928.0625	952.0625
928.0875	952.0875
928.1125	952.1125
928.1375	952.1375
928.1625	952.1625
928.1875	952.1875
928.2125	952.2125
928.2375	952.2375
928.2625	952.2625
928.2875	952.2875
928.3125	952.3125
928.3375	952.3375

UNPAIRED FREQUENCIES (MHZ)

[25 kHz bandwidth]

956.2625	956.3375	956.4125
956.2875	956.3625	956.4375
956.3125	956.3875	

(2) Frequencies listed in this paragraph are designated for private internal use and are subject to site-based licensing.

TABLE 3—PAIRED FREQUENCIES (MHZ)

[12.5 kHz bandwidth]

Remote transmit	Master transmit
928.35625	952.35625
928.36875	952.36872

928.38125	952.38125
928.39375	952.39375
928.40625	952.40625
928.41875	952.41875
928.43125	952.43125
928.44375	952.44375
928.45625	952.45625
928.46875	952.46875
928.48125	952.48125
928.49375	952.49375
928.50625	952.50625
928.51875	952.51875
928.53125	952.53125
928.54375	952.54375
928.55625	952.55625
928.56875	952.56875
928.58125	952.58125
928.59375	952.59375
928.60625	952.60625
928.61875	952.61875
928.63125	952.63125
928.64375	952.64375
928.65625	952.65625
928.66875	952.66875
928.68125	952.68125
928.69375	952.69375
928.70625	952.70625
928.71875	952.71875
928.73125	952.73125
928.74375	952.74375
928.75625	952.75625
928.76875	952.76875
928.78125	952.78125
928.79375	952.79375
928.80625	952.80625
928.81875	952.81875
928.83125	952.83125
928.84375	952.84375

TABLE 4—PAIRED FREQUENCIES (MHZ)

[25 kHz bandwidth]

Remote transmit	**Master transmit**
928.3625	952.3625
928.3875	952.3875
928.4125	952.4125
928.4375	952.4375
928.4625	952.4625
928.4875	952.4875
928.5125	952.5125
928.5375	952.5375

928.5625	952.5625
928.5875	952.5875
928.6125	952.6125
928.6375	952.6375
928.6625	952.6625
928.6875	952.6875
928.7125	952.7125
928.7375	952.7375
928.7625	952.7625
928.7875	952.7875
928.8125	952.8125
928.8375	952.8375

(3) Frequencies listed in this paragraph are not restricted to private internal use and are licensed by geographic area. Incumbent facilities must be protected.

TABLE 5—PAIRED FREQUENCIES (MHZ)

[12.5 kHz bandwidth]

Remote transmit	Master transmit
928.85625	959.85625
928.86875	959.86875
928.88125	959.88125
928.89375	959.89375
928.90625	959.90625
928.91875	959.91875
928.93125	959.93125
928.94375	959.94375
928.95625	959.95625
928.96875	959.96875
928.98125	959.98125
928.99375	959.99375

TABLE 6—PAIRED FREQUENCIES (MHZ)

[25 kHz bandwidth]

Remote transmit	Master transmit
928.8625	959.8625
928.8875	959.8875
928.9125	959.9125
928.9375	959.9375
928.9625	959.9625
928.9875	959.9875

(4) Frequencies listed in this paragraph are licensed by either economic area or on a site-by-site basis.

TABLE 7—PAIRED FREQUENCIES

Remote transmit	Master transmit

Licensed by Economic Area	
(12.5 kHz bandwidth):	
932.00625	941.00625
932.01875	941.01875
932.03125	941.03125
932.04375	941.04375
932.05625	941.05625
932.06875	941.06875
932.08125	941.08125
932.09375	941.09375
(50 kHz bandwidth):	
932.12500	941.12500
(12.5 kHz bandwidth):	
932.15625	941.15625
932.16875	941.16875
932.18125	941.18125
932.19375	941.19375
932.20625	941.20625
932.21875	941.21875
932.23125	941.23125
932.24375	941.24375
Reserved for public safety and private internal use. Licensed on site-by-site basis.	
(12.5 kHz bandwidth):	
932.25625	941.25625
932.26875	941.26875
932.28125	941.28125
932.29375	941.29375
932.30625	941.30625
932.31875	941.31875
932.33125	941.33125
932.34375	941.34375
932.35625	941.35625
932.36875	941.36875
932.38125	941.38125
932.39375	941.39375
932.40625	941.40625

932.41875	941.41875
932.43125	941.43125
Reserved for Public Safety and Federal Government Use. Licensed on site-by-site basis.	
(12.5 kHz bandwidth):	
932.44375	941.44375
932.45625	941.45625
932.46875	941.46875
932.48125	941.48125
932.49375	941.49375

(5) Equivalent power and antenna heights for multiple address master stations:

	Maximum effective radiated power	
Antenna height (AAT) in meters	**Watts**	**dBm**
Above 305	200	53
Above 274 to 305	250	54
Above 244 to 274	315	55
Above 213 to 244	400	56
Above 182 to 213	500	57
Above 152.5 to 182	630	58
152.5 and below	1,000	60

For mobile operations the maximum ERP is 25 watts (44 dBm).

(6) Fixed point-to-point frequencies.

TABLE 8—PAIRED FREQUENCIES

[All frequencies may be used by Common Carrier Fixed Point-to-Point and Private Operational Fixed Point-to-Point Microwave Service licensees; 25 kHz bandwidth]

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
932.5125	941.5125
932.5375	941.5375
932.5625	941.5625
932.5875	941.5875
932.6125	941.6125
932.6375	941.6375
932.6625	941.6625
934.8375	943.8375
934.8625	943.8625
934.8875	943.8875
934.9125	943.9125
934.9375	943.9375
934.9625	943.9625
934.9875	943.9875

TABLE 9—PAIRED FREQUENCIES

[Frequencies may be used only by Private Operational Fixed Point-to-Point Microwave Service licensees, unless otherwise noted; 50 kHz bandwidth]

Transmit (receive) (MHz)	Receive (transmit) (MHz)
932.70[1]	[1]941.70
932.75[1]	[1]941.75
934.80[1]	[1]943.80
956.65	953.05
956.75	953.15
956.85	953.25
956.95	953.35
957.05	953.45
957.25	953.65
957.35	953.75
957.45	953.85
957.65	954.05
957.75	954.15
957.85	954.25
958.05	954.45
958.15	954.55
958.25	954.65
958.45	954.85
958.55	954.95
958.65	955.05
958.85	955.25
958.95	955.35
959.05	955.45
959.25	955.65
959.35	955.75
959.45	955.85
959.55	955.95
959.65	956.05

[1]These frequencies also may be used by Common Carrier Fixed Point-to-Point Microwave licensees.

TABLE 10—PAIRED FREQUENCIES

[Frequencies may be used only by Private Operational Fixed Point-to-Point Microwave licensees, unless otherwise noted; 100 kHz bandwidth]

Transmit (receive) (MHz)	Receive (transmit) (MHz)
932.8250[1]	[1]941.8250
932.9250[1]	[1]941.9250
933.0250[1]	[1]942.0250
934.5250[1]	[1]943.5250
934.6250[1]	[1]943.6250
934.7250[1]	[1]943.7250
956.6	953.0

956.7	953.1
956.8	953.2
956.9	953.3
957.0	953.4
957.1	953.5
957.2	953.6
957.3	953.7
957.4	953.8
957.5	953.9
957.6	954.0
957.7	954.1
957.8	954.2
957.9	954.3
958.0	954.4
958.1	954.5
958.2	954.6
958.3	954.7
958.4	954.8
958.5	954.9
958.6	955.0
958.7	955.1
958.8	955.2
958.9	955.3
959.0	955.4
959.1	955.5
959.2	955.6
959.3	955.7
959.4	955.8
959.5	955.9
959.6	956.0
959.7	956.1

[1]These frequencies also may be used by Common Carrier Fixed Point-to-Point Microwave licensees.

TABLE 11—PAIRED FREQUENCIES

[Frequencies may be used only by Private Operational Fixed Point-to-Point Microwave licensees, unless otherwise noted; (200 kHz bandwidth)]

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
933.1750[1]	[1]942.1750
933.3750[1]	[1]942.3750
933.5750[1]	[1]942.5750
933.7750[1]	[1]942.7750
933.9750[1]	[1]942.9750
934.1750[1]	[1]943.1750
934.3750[1]	[1]943.3750
957.15	953.55
957.55	953.95
957.95	954.35
958.35	954.75

958.75	955.15
959.15	955.55

[1]These frequencies also may be used by Common Carrier Fixed Point-to-Point Microwave licensees.

(c) *1850-1990 MHz.* (1) 10 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1855	1935
1865	1945
1875	1955
1885	1965
1895	1975
1905	1985

UNPAIRED FREQUENCIES

1915[1]
1925[1]

[1]Available for systems employing one-way transmission.

(2) 5 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1860	1940
1870	1950
1880	1960
1890	1970
1900	1980

(d) *2130-2150 MHz; 2180-2200 MHz.* 800 kHz maximum bandwidth, unless noted.

PAIRED FREQUENCIES

2130-2150	2180-2200
Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
2130.8	2180.8
2131.6	[1]2181.6
2132.4	2182.4
2133.2	[1]2183.2
2134.0	2184.0
2134.8	[1]2184.8
2135.6	2185.6
2136.4	[1]2186.4
2137.2	2187.2

2138.0	[1]2188.0
2139.6	[1]2189.6
2138.8	2188.8
2140.4	2190.4
2141.2	[1]2191.2
2142.0	2192.0
2142.8	[1]2192.8
2143.6	2193.6
2144.4	[1]2194.4
2145.2	2195.2
2146.0	[1]2196.0
2146.8	2196.8
2147.6	[1]2197.6
2148.4	2198.4
2149.2	2199.2

[1]Consideration will be given on a case-by-case basis to assigning these frequency pairs to systems employing 1600 KHz bandwidth transmissions.

(e) [Reserved]

(f) *2450-2500 MHz.* (1) This band is shared with other communications services and is not subject to protection from interference from industrial, scientific, and medical devices operating on 2450 MHz.

(2) Stations licensed in this band under this part prior to March 1, 1996, are grandfathered and may continue their authorized operations. Stations licensed in the 2483.5-2500 MHz portion of the band as of July 25, 1985, and licensees whose initial applications were filed on or before July 25, 1985, are grandfathered, and may continue operations, subject only to license renewal, on a co-primary basis with with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, their operations are also on a co-primary basis with part 27 fixed and mobile except aeronautical mobile service operations.

(3) 625 KHz bandwidth channels. The normal bandwidth authorized will be 625 KHz. Upon adequate justification, additional contiguous channels may be authorized to provide up to a 2500 KHz bandwidth.

PAIRED FREQUENCIES

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
2450.3125	2467.5625
2450.9375	2468.1875
2451.5625	2468.8125
2452.1875	2469.4375
2452.8125	2470.0625
2453.4375	2470.6875
2454.0625	2471.3125
2454.6875	2471.9375
2455.3125	2472.5625
2455.9375	2473.1875
2456.5625	2473.8125
2457.1875	2474.4375

2457.8125	2475.0625
2458.4375	2475.6875
2459.0625	2476.3125
2459.6875	2476.9375
2460.3125	2477.5625
2460.9375	2478.1875
2461.5625	2478.8125
2462.1875	2479.4375
2462.8125	2480.0625
2463.4375	2480.6875
2464.0625	2481.3125
2464.6875	2481.9375
2465.3125	2482.5625
2465.9375	2483.1875

(g) [Reserved]

(h) *3,700 to 4,200 MHz.* 20 MHz maximum authorized bandwidth.

20 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
3710	3750
3730	3770
3790	3830
3810	3850
3870	3910
3890	3930
3950	3990
3970	4010
4030	4070
4050	4090
4110	4150
4130	4170
N/A	[1]4190

[1]This frequency may be assigned for unpaired use.

(i) *5,925 to 6,425 MHz.* 60 MHz authorized bandwidth.

(1) 400 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5925.225	6177.100
5925.625	6177.500
5926.050	6177.925
5926.450	6178.325
5926.875	6178.750
5927.275	6179.150
5927.725	6179.600
5928.125	6180.000
5928.550	6180.425

5928.950	6180.825
5929.375	6181.250
5929.775	6181.650
6168.350	6420.225
6168.750	6420.625
6169.175	6421.050
6169.575	6421.450
6170.000	6421.875
6170.400	6422.275
6170.850	6422.725
6171.250	6423.125
6171.675	6423.550
6172.075	6423.950
6172.500	6424.375
6172.900	6424.775

(2) 800 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5925.425	6177.300
5926.250	6178.125
5927.075	6178.950
5927.925	6179.800
5928.750	6180.625
5929.575	6181.450
6168.550	6420.425
6169.375	6421.250
6170.200	6422.075
6171.050	6422.925
6171.875	6423.750
6172.700	6424.575

(3) 1.25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5925.625	6177.500
5926.875	6178.750
5928.125	6180.000
5929.375	6181.250
6108.893	6360.933
6110.128	6362.168
6111.364	6363.404
6112.599	6364.639
6113.834	6365.874
6115.070	6367.110
6116.305	6368.345
6117.541	6369.581
6118.776	6370.816
6120.011	6372.051
6121.247	6373.287
6122.482	6374.522
6123.718	6375.758

6124.953	6376.993
6126.189	6378.229
6127.424	6379.464
6128.659	6380.699
6129.895	6381.935
6131.130	6383.170
6132.366	6384.406
6133.601	6385.641
6134.836	6386.876
6136.072	6388.112
6137.307	6389.347
6138.543	6390.583
6139.778	6391.818
6141.014	6393.054
6142.249	6394.289
6143.484	6395.524
6144.720	6396.760
6145.955	6397.995
6147.191	6399.231
6148.426	6400.466
6149.661	6401.701
6150.897	6402.937
6152.132	6404.172
6153.368	6405.408
6154.603	6406.643
6155.839	6407.879
6157.074	6409.114
6158.309	6410.349
6159.545	6411.585
6160.780	6412.820
6162.016	6414.056
6163.251	6415.291
6164.486	6416.526
6165.722	6417.762
6166.957	6418.997
6168.750	6420.625
6170.000	6421.875
6171.250	6423.125
6172.500	6424.375
6173.750[1]	N/A
6175.000[1]	N/A
6176.250[1]	N/A

[1]These frequencies may be assigned for unpaired use.

(4) 2.5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5926.250	6178.125
5928.750	6180.625
6109.510	6361.550
6111.981	6364.021

6114.452	6366.492
6116.923	6368.963
6119.394	6371.434
6121.865	6373.905
6124.335	6376.375
6126.806	6378.846
6129.277	6381.317
6131.748	6383.788
6134.219	6386.259
6136.690	6388.730
6139.160	6391.200
6141.631	6393.671
6144.102	6396.142
6146.573	6398.613
6149.044	6401.084
6151.515	6403.555
6153.985	6406.025
6156.456	6408.496
6158.927	6410.967
6161.398	6413.438
6163.869	6415.909
6166.340	6418.380
6169.375	6421.250
6171.875	6423.750
6175.625[1]	N/A

[1]This frequency may be assigned for unpaired use.

(5) 3.75 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6111.364	6363.404
6116.305	6368.345
6121.247	6373.287
6126.189	6378.229
6131.130	6383.170
6136.072	6388.112
6141.014	6393.054
6145.955	6397.995
6150.897	6402.937
6155.839	6407.879
6160.780	6412.820
6165.722	6417.762
6175.000[1]	N/A

[1]This frequency may be assigned for unpaired use.

(6) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6110.75	6362.79
6115.69	6367.73

6120.63	6372.67
6125.57	6377.61
6130.51	6382.55
6135.45	6387.49
6140.40	6392.44
6145.34	6397.38
6150.28	6402.32
6155.22	6407.26
6160.16	6412.20
6165.10	6417.14

(7) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5935.32	6187.36
5945.20	6197.24
5955.08	6207.12
5964.97	6217.01
5974.85	6226.89
5984.73	6236.77
5994.62	6246.66
6004.50	6256.54
6014.38	6266.42
6024.27	6276.31
6034.15	6286.19
6044.03	6296.07
6053.92	6305.96
6063.80	6315.84
6073.68	6325.72
6083.57	6335.61
6093.45	6345.49
6103.33	6355.37
6113.22[1]	[1]6365.26
6123.10[1]	[1]6375.14
6132.98[1]	[1]6385.02
6142.87[1]	[1]6394.91
6152.75[1]	[1]6404.79
6162.63[1]	[1]6414.67

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

(8) 30 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5945.20	6197.24
5974.85	6226.89
6004.50	6256.54
6034.15	6286.19
6063.80	6315.84
6093.45	6345.49
6123.10[1]	[1]6375.14

6152.75[1]	[1]6404.79

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

(9) 60 MHz bandwidth channels:[1]

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
5960.025	6212.065
6019.325	6271.365
6078.625	6330.665
6137.925	6389.965

(j) *6,425 to 6,525 MHz: Mobile.* Paired and un-paired operations permitted. Use of this spectrum for direct delivery of video programs to the general public or multi-channel cable distribution is not permitted. This band is co-equally shared with mobile stations licensed pursuant to parts 74 and 78 of the Commission's Rules. Stations not intended to be operated while in motion will be licensed under the provision of §101.31. The following channel plans apply.

(1) 1 MHz maximum authorized bandwidth channels:

Transmit (or receive) (MHz)	**Receive (or transmit) (MHz)**
6425.5	6475.5
6450.5	6500.5

(2) 8 MHz maximum authorized bandwidth channels:

Transmit (or receive) (MHz)	**Receive (or transmit) (MHz)**
6430.0	6480.0
6438.0	6488.0
6446.0	6596.0
6455.0	6505.0
6463.0	6513.0
6471.0	6521.0

(3) 25 MHz maximum authorized bandwidth channels:

Transmit (or receive) (MHz)	**Receive (or transmit) (MHz)**
6437.5	6487.5
6462.5	6512.5

(k) *6,525 to 6,875 MHz.* 10 MHz authorized bandwidth.

(1) 400 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6525.225	6870.225
6525.625	6870.625
6526.050	6871.050
6526.450	6871.450

6526.875	6871.875
6527.275	6872.275
6527.725	6872.725
6528.125	6873.125
6528.550	6873.550
6528.950	6873.950
6529.375	6874.375
6529.775	6874.775

(2) 800 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6525.425	6870.425
6526.250	6871.250
6527.075	6872.075
6527.925	6872.925
6528.750	6873.750
6529.575	6874.575

(3) 1.25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6525.625	6870.625
6526.875	6871.875
6528.125	6873.125
6529.375	6874.375
6540.625[1]	[1]6718.125
6541.875[1]	[1]6719.375
6543.125[1]	[1]6713.125
6544.375[1]	[1]6714.375
6545.625[1]	[1]6715.625
6546.875[1]	[1]6716.875
6548.125	6728.125
6549.375	6729.375
6550.625	6730.625
6551.875	6731.875
6553.125[1]	[1]6723.125
6554.375[1]	[1]6724.375
6555.625[1]	[1]6725.625
6556.875[1]	[1]6726.875
6558.125	6738.125
6559.375	6739.375
6560.625	6740.625
6561.875	6741.875
6563.125	6733.125
6564.375	6734.375
6565.625	6735.625
6566.875	6736.875
6568.125[1]	[1]6720.625
6569.375[1]	[1]6721.875
6580.625[1]	[1]6868.125
6581.875[1]	[1]6869.375

6583.125	6743.125
6584.375	6744.375
6585.625	6745.625
6586.875	6746.875
6588.125	6748.125
6589.375	6749.375
6590.625	6750.625
6591.875	6751.875
6593.125	6753.125
6594.375	6754.375
6595.625	6755.625
6596.875	6756.875
6598.125	6758.125
6599.375	6759.375
6600.625	6760.625
6601.875	6761.875
6603.125	6763.125
6604.375	6764.375
6605.625	6765.625
6606.875	6766.875
6608.125	6768.125
6609.375	6769.375
6610.625	6770.625
6611.875	6771.875
6613.125	6773.125
6614.375	6774.375
6615.625	6775.625
6616.875	6776.875
6618.125	6778.125
6619.375	6779.375
6620.625	6780.625
6621.875	6781.875
6623.125	6783.125
6624.375	6784.375
6625.625	6785.625
6626.875	6786.875
6628.125	6788.125
6629.375	6789.375
6630.625	6790.625
6631.875	6791.875
6633.125	6793.125
6634.375	6794.375
6635.625	6795.625
6636.875	6796.875
6638.125	6798.125
6639.375	6799.375
6640.625	6800.625
6641.875	6801.875
6643.125	6803.125
6644.375	6804.375
6645.625	6805.625
6646.875	6806.875

6648.125	6808.125
6649.375	6809.375
6650.625	6810.625
6651.875	6811.875
6653.125	6813.125
6654.375	6814.375
6655.625	6815.625
6656.875	6816.875
6658.125	6818.125
6659.375	6819.375
6660.625	6820.625
6661.875	6821.875
6663.125	6823.125
6664.375	6824.375
6665.625	6825.625
6666.875	6826.875
6668.125	6828.125
6669.375	6829.375
6670.625	6830.625
6671.875	6831.875
6673.125	6833.125
6674.375	6834.375
6675.625	6835.625
6676.875	6836.875
6678.125	6838.125
6679.375	6839.375
6680.625	6840.625
6681.875	6841.875
6683.125	6843.125
6684.375	6844.375
6685.625	6845.625
6686.875	6846.875
6688.125	6848.125
6689.375	6849.375
6690.625	6850.625
6691.875	6851.875
6693.125	6853.125
6694.375	6854.375
6695.625	6855.625
6696.875	6856.875
6698.125	6858.125
6699.375	6859.375
6700.625	6860.625
6701.875	6861.875
6703.125	6863.125
6704.375	6864.375
6705.625	6865.625
6706.875	6866.875
6708.125[1]	[1]6710.625
6709.375[1]	[1]6711.875

[1]These frequencies may be assigned for unpaired use.

(4) 2.5 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6526.25	6871.25
6528.75	6873.75
6541.25[1]	[1]6718.75
6543.75[1]	[1]6713.75
6546.25[1]	[1]6716.25
6548.75	6728.75
6551.25	6731.25
6553.75[1]	[1]6723.75
6556.25[1]	[1]6726.25
6558.75	6738.75
6561.25	6741.25
6563.75	6733.75
6566.25	6736.25
6568.75[1]	[1]6721.25
6581.25[1]	[1]6868.75
6583.75	6743.75
6586.25	6746.25
6588.75	6748.75
6591.25	6751.25
6593.75	6753.75
6596.25	6756.25
6598.75	6758.75
6601.25	6761.25
6603.75	6763.75
6606.25	6766.25
6608.75	6768.75
6611.25	6771.25
6613.75	6773.75
6616.25	6776.25
6618.75	6778.75
6621.25	6781.25
6623.75	6783.75
6626.25	6786.25
6628.75	6788.75
6631.25	6791.25
6633.75	6793.75
6636.25	6796.25
6638.75	6798.75
6641.25	6801.25
6643.75	6803.75
6646.25	6806.25
6648.75	6808.75
6651.25	6811.25
6653.75	6813.75
6656.25	6816.25
6658.75	6818.75

6661.25	6821.25
6663.75	6823.75
6666.25	6826.25
6668.75	6828.75
6671.25	6831.25
6673.75	6833.75
6676.25	6836.25
6678.75	6838.75
6681.25	6841.25
6683.75	6843.75
6686.25	6846.25
6688.75	6848.75
6691.25	6851.25
6693.75	6853.75
6696.25	6856.25
6698.75	6858.75
6701.25	6861.25
6703.75	6863.75
6706.25	6866.25
6708.75[1]	[1]6711.25

[1]These frequencies may be assigned for unpaired use.

(5) 3.75 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6545.625[1]	6715.625[1]
6550.625	6730.625
6555.625[1]	6725.625[1]
6560.625	6740.625
6565.625	6735.625
6585.625	6745.625
6590.625	6750.625
6595.625	6755.625
6600.625	6760.625
6605.625	6765.625
6610.625	6770.625
6615.625	6775.625
6620.625	6780.625
6625.625	6785.625
6630.625	6790.625
6635.625	6795.625
6640.625	6800.625
6645.625	6805.625
6650.625	6810.625
6655.625	6815.625
6660.625	6820.625
6665.625	6825.625
6670.625	6830.625
6675.625	6835.625
6680.625	6840.625
6685.625	6845.625

6690.625	6850.625
6695.625	6855.625
6700.625	6860.625
6705.625	6865.625
6710.625[1]	[1]6720.625

[1]These frequencies may be assigned for unpaired use.

(6) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6545[1]	[1]6715
6550	6730
6555[1]	[1]6725
6560	6740
6565	6735
6585	6745
6590	6750
6595	6755
6600	6760
6605	6765
6610	6770
6615	6775
6620	6780
6625	6785
6630	6790
6635	6795
6640	6800
6645	6805
6650	6810
6655	6815
6660	6820
6665	6825
6670	6830
6675	6835
6680	6840
6685	6845
6690	6850
6695	6855
6700	6860
6705	6865
6710[1]	[1]6720

[1]These frequencies may be assigned for unpaired use.

(7) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6545[1]	[1]6715
6555[1]	[1]6725
6565	6735
6585	6745

6595	6755
6605	6765
6615	6775
6625	6785
6635	6795
6645	6805
6655	6815
6665	6825
6675	6835
6685	6845
6695	6855
6705	6865
6535[2]	[2]6575

[1]These frequencies may be assigned for unpaired use.

[2]Available only for emergency restoration, maintenance bypass, or other temporary-fixed purposes. Such uses are authorized on a non-interference basis to other frequencies in this band. Interference analysis required by §101.105 does not apply to this frequency pair.

(8) 30 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6555	6725
6595	6755
6625	6785
6655	6815
6685	6845

(l) *6875 to 7125 MHz.* 25 MHz authorized bandwidth.

(1) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6877.5	7027.5
6882.5	7032.5
6887.5	7037.5
6892.5	7042.5
6897.5	7047.5
6902.5	7052.5
6907.5	7057.5
6912.5	7062.5
6917.5	7067.5
6922.5	7072.5
6927.5	7077.5
6932.5	7082.5
6937.5	7087.5
6942.5	7092.5
6947.5	7097.5
6952.5	7102.5

6957.5	7107.5
6962.5	7112.5
6967.5	7117.5
6972.5	7122.5

(2) 8.33 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6879.165	7029.165
6887.495	7037.495
6895.825	7045.825
6904.155	7054.155
6912.485	7062.485
6920.815	7070.815
6929.145	7079.145
6937.475	7087.475
6945.805	7095.805
6954.135	7104.135
6962.465	7112.465
6970.795	7120.795

(3) 12.5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6881.25	7031.25
6893.75	7043.75
6906.25	7056.25
6918.75	7068.75
6931.25	7081.25
6943.75	7093.75
6956.25	7106.25
6968.75	7118.75

(4) 25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
6887.5	7037.5
6912.5	7062.5
6937.5	7087.5
6962.5	7112.5

(m) *10,550 to 10,680 MHz.* 5 MHz authorized bandwidth.

(1) 400 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**

10605.225	10670.225
10605.625	10670.625
10606.050	10671.050
10606.450	10671.450
10606.875	10671.875
10607.275	10672.275
10607.725	10672.725
10608.125	10673.125
10608.550	10673.550
10608.950	10673.950
10609.375	10674.375
10609.775	10674.775
10610.225	10675.225
10610.625	10675.625
10611.050	10676.050
10611.450	10676.450
10611.875	10676.875
10612.275	10677.275
10612.725	10677.725
10613.125	10678.125
10613.550	10678.550
10613.950	10678.950
10614.375	10679.375
10614.775	10679.775

(2) 800 kHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10605.425	10670.425
10606.250	10671.250
10607.075	10672.075
10607.925	10672.925
10608.750	10673.750
10609.575	10674.575
10610.425	10675.425
10611.250	10676.250
10612.075	10677.075
10612.925	10677.925
10613.750	10678.750
10614.575	10679.575

(3) 1.25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10550.625	10615.625
10551.875	10616.875
10553.125	10618.125
10554.375	10619.375
10555.625	10620.625
10556.875	10621.875
10558.125	10623.125
10559.375	10624.375

10560.625	10625.625
10561.875	10626.875
10563.125	10628.125
10564.375	10629.375
10565.625	10630.625
10566.875	10631.875
10568.125	10633.125
10569.375	10634.375
10570.625	10635.625
10571.875	10636.875
10573.125	10638.125
10574.375	10639.375
10575.625	10640.625
10576.875	10641.875
10578.125	10643.125
10579.375	10644.375
10580.625	10645.625
10581.875	10646.875
10583.125	10648.125
10584.375	10649.375
10585.625	10650.625
10586.875	10651.875
10588.125	10653.125
10589.375	10654.375
10590.625	10655.625
10591.875	10656.875
10593.125	10658.125
10594.375	10659.375
10595.625	10660.625
10596.875	10661.875
10598.125	10663.125
10599.375	10664.375
10600.625	10665.625
10601.875	10666.875
10603.125	10668.125
10604.375	10669.375
10605.625	10670.625
10606.875	10671.875
10608.125	10673.125
10609.375	10674.375
10610.625	10675.625
10611.875	10676.875
10613.125	10678.125
10614.375	10679.375

(4) 2.5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10551.25	10616.25
10553.75	10618.75
10556.25	10621.25
10558.75	10623.75

10561.25	10626.25
10563.75	10628.75
10566.25	10631.25
10568.75	10633.75
10571.25	10636.25
10573.75	10638.75
10576.25	10641.25
10578.75	10643.75
10581.25[1]	[1]10646.25
10583.75[1]	[1]10648.75
10586.25[1]	[1]10651.25
10588.75[1]	[1]10653.75
10591.25[1]	[1]10656.25
10593.75[1]	[1]10658.75
10596.25[1]	[1]10661.25
10598.75[1]	[1]10663.75
10601.25[1]	[1]10666.25
10603.75[1]	[1]10668.75
10606.25[1]	[1]10671.25
10608.75[1]	[1]10673.75
10611.25[1]	[1]10676.25
10613.75[1]	[1]10678.75

[1]These frequencies are also available for DEMS stations licensed, in operation, or applied for prior to July 15, 1993.

(5) 3.75 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10553.125	10618.125
10558.125	10623.125
10563.125	10628.125
10568.125	10633.125
10573.125	10638.125
10578.125	10643.125
10583.125	10648.125
10588.125	10653.125
10593.125	10658.125
10598.125	10663.125
10603.125	10668.125

(6) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10552.5	10617.5
10557.5	10622.5
10562.5	10627.5
10567.5[1]	[1]10632.5
10572.5[1]	[1]10637.5
10577.5[1]	[1]10642.5
10582.5[1]	[1]10647.5
10587.5	10652.5

10592.5	10657.5
10597.5	10662.5
10602.5	10667.5

[1]These frequencies are also available for DEMS stations licensed, in operation, or applied for prior to July 15, 1993.

(n) Point-to-multipoint systems licensed, in operation, or applied for in the 10,550-10,680 MHz band prior to July 15, 1993, are permitted to use the DEMS frequencies noted above if they prior coordinate such usage with the necessary parties including 10 GHz point-to-point applicants and licensees. DEMS Nodal Stations shall use the band 10,565-10,615 MHz while DEMS User Stations shall use the band 10,630-10,680 MHz.

(o) *10,700 to 11,700 MHz.* 80 MHz authorized bandwidth.

(1) 1.25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
11130.625	11620.625
11131.875	11621.875
11133.125	11623.125
11134.375	11624.375
11135.625	11625.625
11136.875	11626.875
11138.125	11628.125
11139.375	11629.375
11140.625	11630.625
11141.875	11631.875
11143.125	11633.125
11144.375	11634.375
11145.625	11635.625
11146.875	11636.875
11148.125	11638.125
11149.375	11639.375
11150.625	11640.625
11151.875	11641.875
11153.125	11643.125
11154.375	11644.375
11155.625	11645.625
11156.875	11646.875
11158.125	11648.125
11159.375	11649.375
11160.625	11650.625
11161.875	11651.875
11163.125	11653.125
11164.375	11654.375
11165.625	11655.625
11166.875	11656.875
11168.125	11658.125
11169.375	11659.375
11170.625	11660.625
11171.875	11661.875

11173.125	11663.125
11174.375	11664.375
11175.625	11665.625
11176.875	11666.875
11178.125	11668.125
11179.375	11669.375
11180.625	11680.625
11181.875	11681.875
11183.125	11683.125
11184.375	11684.375
11185.625	11685.625
11186.875	11686.875
11188.125	11688.125
11189.375	11689.375
11190.625	11690.625
11191.875	11691.875
11193.125	11693.125
11194.375	11694.375
11195.625	11695.625
11196.875	11696.875
11198.125	11698.125
11199.375	11699.375

(2) 2.5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
11131.25	11621.25
11133.75	11623.75
11136.25	11626.25
11138.75	11628.75
11141.25	11631.25
11143.75	11633.75
11146.25	11636.25
11148.75	11638.75
11151.25	11641.25
11153.75	11643.75
11156.25	11646.25
11158.75	11648.75
11161.25	11651.25
11163.75	11653.75
11166.25	11656.25
11168.75	11658.75
11171.25	11661.25
11173.75	11663.75
11176.25	11666.25
11178.75	11668.75
11181.25	11681.25
11183.75	11683.75
11186.25	11686.25
11188.75	11688.75
11191.25	11691.25
11193.75	11693.75

11196.25	11696.25
11198.75	11698.75

(3) 3.75 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
11133.125	11623.125
11138.125	11628.125
11143.125	11633.125
11148.125	11638.125
11153.125	11643.125
11158.125	11648.125
11163.125	11653.125
11168.125	11658.125
11173.125	11663.125
11178.125	11668.125
11183.125	11683.125
11188.125	11688.125
11193.125	11693.125
11198.125	11698.125

(4) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
11132.5	11622.5
11137.5	11627.5
11142.5	11632.5
11147.5	11637.5
11152.5	11642.5
11157.5	11647.5
11162.5	11652.5
11167.5	11657.5
11172.5	11662.5
11177.5	11667.5
11182.5	11682.5
11187.5	11687.5
11192.5	11692.5
11197.5	11697.5

(5) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10705	11205
10715	11215
10725[2]	[1]11675
10735	11225
10745	11235
10755	11245
10765	11255
10775	11265
10785	11275
10795	11285

10805	11295
10815	11305
10825	11315
10835	11325
10845	11335
10855	11345
10865	11355
10875	11365
10885	11375
10895	11385
10905	11395
10915	11405
10925	11415
10935	11425
10945	11435
10955	11445
10965	11455
10975	11465
10985	11475
10995	11485
11005	11495
11015	11505
11025	11515
11035	11525
11045	11535
11055	11545
11065	11555
11075	11565
11085	11575
11095	11585
11105	11595
11115	11605
11125	11615
11135[1]	[1]11625
11145[1]	[1]11635
11155[1]	[1]11645
11165[1]	[1]11655
11175[1]	[1]11665
11185[1]	[1]11685
11195[1]	[1]11695

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

[2]These frequencies may be assigned for unpaired use.

(6) 30 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10715	11215
10755	11245
10795	11285

10835	11325
10875	11365
10915	11405
10955	11445
10995	11485
11035	11525
11075	11565
11115	11605
11155[1]	[1]11645
11185[1]	[1]11685

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

(7) 40 MHz bandwidth channels:[2]

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10735	11225
10775	11265
10815	11305
10855	11345
10895	11385
10935	11425
10975	11465
11015	11505
11055	11545
11095	11585
11135[1]	[1]11625
11175[1]	[1]11665

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

[2]In congested areas where 40 MHz channels block most 30 MHz channels, radios authorized for 30 MHz bandwidths may use the 40 MHz channels. In uncongested areas, 30 MHz channels should be used.

(8) 80 MHz bandwidth channels:[1]

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
10755	11245
10835	11325
10915	11405
10995	11485
11075	11565
11155	11645

(p) *12,200 to 13,150 MHz.* (1) *12,000-12,700 MHz.* The Commission has allocated the 12.2-12.7 GHz band for use by the Direct Broadcast Satellite Service (DBS)~~,~~ and the ~~Multichannel Video Distribution and Data Service (MVDDS), and the Non-Geostationary Satellite Orbit Fixed Satellite~~

~~Service (NGSO FSS). MVDDS~~Lower Microwave Flexible Use Service (LMFUS). LMFUS shall be licensed on a non-harmful interference co-primary basis to existing DBS operations~~ and on a co-primary basis with NGSO FSS stations in this band. MVDDS~~. LMFUS use can be on a common carrier and/or non-common carrier basis and can use channels of any desired bandwidth up to the maximum of 500 MHz~~ provided the EIRP does not exceed 14 dBm per 24 megahertz~~. Private operational fixed point-to-point microwave stations authorized after September 9, 1983, are licensed on a non-harmful interference basis to DBS and are required to make any and all adjustments necessary to prevent harmful interference to operating domestic DBS receivers. Incumbent public safety licensees shall be afforded protection from ~~MVDDS and NGSO FSS licensees~~LMFUS, however all other private operational fixed licensees shall be secondary to DBS~~, MVDDS~~ and ~~NGSO FSS licensees~~LMFUS. As of May 23, 2002, the Commission ~~no longer accepts~~will accept applications for new licenses for point-to-point private operational fixed stations in this band, ~~however,~~and incumbent licensees and previously filed applicants may file applications for minor modifications and amendments (as defined in §1.929 of this chapter) thereto, renewals, transfer of control, or assignment of license. Licenses for private operational fixed point-to-point services granted after **[effective date]** shall be governed by part 30 of this chapter. Notwithstanding any other provisions, no private operational fixed point-to-point microwave stations are permitted to cause harmful interference to broadcasting-satellite stations of other countries operating in accordance with the Region 2 plan for the Broadcasting-Satellite Service established at the 1983 WARC.

(2) *12,700 to 13,150 MHz.* 50 MHz authorized bandwidth.

(i) 5 MHz channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
12702.5	12927.5
12707.5	12932.5
12712.5	12937.5
12717.5	12942.5
12722.5	12947.5
12727.5	12952.5
12732.5	12957.5
12737.5	12962.5
12742.5	12967.5
12747.5	12972.5
12752.5	12977.5
12757.5	12982.5
12762.5	12987.5
12767.5	12992.5
12772.5	12997.5
12777.5	13002.5
12782.5	13007.5
12787.5	13012.5
12792.5	13017.5
12797.5	13022.5
12802.5	13027.5
12807.5	13032.5
12812.5	13037.5
12817.5	13042.5
12822.5	13047.5
12827.5	13052.5

12832.5	13057.5
12837.5	13062.5
12842.5	13067.5
12847.5	13072.5
12852.5	13077.5
12857.5	13082.5
12862.5	13087.5
12867.5	13092.5
12872.5	13097.5
12877.5	13102.5
12882.5	13107.5
12887.5	13112.5
12892.5	13117.5
12897.5	13122.5
12902.5	13127.5
12907.5	13132.5
12912.5	13137.5
12917.5	13142.5
12922.5	13147.5

(ii) 8.33 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
12704.165	12929.165
12712.495	12937.495
12720.825	12945.825
12729.155	12954.155
12737.485	12962.485
12745.815	12970.815
12754.145	12979.145
12762.475	12987.475
12770.805	12995.805
12779.135	13004.135
12787.465	13012.465
12795.795	13020.795
12804.125	13029.125
12812.455	13037.455
12820.785	13045.785
12829.115	13054.115
12837.445	13062.445
12845.775	13070.775
12854.105	13079.105
12862.435	13087.435
12870.765	13095.765
12879.095	13104.095
12887.425	13112.425
12895.755	13120.755
12904.085	13129.085
12912.415	13137.415

(iii) 12.5 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
12706.25	12931.25
12718.75	12943.75
12731.25	12956.25
12743.75	12968.75
12756.25	12981.25
12768.75	12993.75
12781.25	13006.25
12793.75	13018.75
12806.25	13031.25
12818.75	13043.75
12831.25	13056.25
12843.75	13068.75
12856.25	13081.25
12868.75	13093.75
12881.25	13106.25
12893.75	13118.75
12906.25	13131.25
12918.75	13143.75

(iv) 25 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
12712.5	12937.5
12737.5	12962.5
12762.5	12987.5
12787.5	13012.5
12812.5	13037.5
12837.5	13062.5
12862.5	13087.5
12887.5	13112.5
12912.5	13137.5

(v) 50 MHz bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
12725	12950
12775	13000
12825	13050
12875	13100

(q) [Reserved]

~~(q) Special provisions for incumbent low power, limited coverage systems in the band segments 12.2-12.7 GHz.~~

~~(1) As of May 23, 2002, the Commission no longer accepts applications for new stations in this service and incumbent stations may remain in service provided they do not cause harmful interference to any other primary services licensed in this band as described in paragraph (p) of this section. However, incumbent licensees and previously filed applicants may file applications for minor modifications and amendments (as defined in §1.929 of this chapter) thereto, renewals, transfer of control, or assignment of license.~~

~~(2) Prior to December 8, 2000, notwithstanding any contrary provisions in this part, the frequency pairs 12.220/12.460 GHz, 12.260/12.500 GHz, 12.300/12.540 GHz and 12.340/12.580 GHz, were authorized for low power, limited coverage systems subject to the following provisions:~~

~~(i) Maximum equivalent isotropically radiated power (EIRP) shall be 55 dBm;~~

~~(ii) The rated transmitter output power shall not exceed 0.5 watts;~~

~~(iii) Frequency tolerance shall be maintained to within 0.01 percent of the assigned frequency;~~

~~(iv) Maximum beamwidth shall not exceed 4 degrees. However, the sidelobe suppression criteria contained in §101.115 shall not apply, except that a minimum front-to-back ratio of 38 dB shall apply;~~

~~(v) Upon showing of need, a maximum bandwidth of 12 MHz may be authorized per frequency assigned;~~

~~(vi) Radio systems authorized under the provisions of this section shall have no more than three hops in tandem, except upon showing of need, but in any event the maximum tandem length shall not exceed 40 km (25 miles);~~

~~(vii) Interfering signals at the receiver antenna terminals of stations authorized under this section shall not exceed −90 dBm and −70 dBm respectively, for co-channel and adjacent channel interfering signals, and~~

~~(viii) Stations authorized under the provisions of this section shall provide the protection from interference specified in §101.105 to stations operating in accordance with the provisions of this part.~~

(r) *17,700 to 19,700 and 24,250 to 25,250 MHz:* Operation of stations using frequencies in these bands is permitted to the extent specified in this paragraph. Until November 19, 2012, stations operating in the band 18.3-18.58 GHz that were licensed or had applications pending before the Commission as of November 19, 2002 shall operate on a shared co-primary basis with other services under parts 21, 25, 74, and 78 of this chapter. Until October 31, 2011, operations in the band 19.26-19.3 GHz and low power systems operating pursuant to paragraph (r)(10) of this section shall operate on a co-primary basis. Until June 8, 2010, stations operating in the band 18.58-18.8 GHz that were licensed or had applications pending before the Commission as of June 8, 2000 may continue those operations on a shared co-primary basis with other services under parts 21, 25, 74, and 78 of this chapter. Until June 8, 2010, stations operating in the band 18.8-19.3 GHz that were licensed or had applications pending before the Commission as of September 18, 1998 may continue those operations on a shared co-primary basis with other services under parts 21, 25, 74, and 78 of this chapter. After November 19, 2012, stations operating in the band 18.3-18.58 GHz are not entitled to protection from fixed-satellite service operations and must not cause unacceptable interference to fixed-satellite service station operations. After June 8, 2010, operations in the 18.58-19.30 GHz band are not entitled to protection from fixed-satellite service operations and must not cause unacceptable interference to fixed-satellite service station operations. After November 19, 2002, no applications for new stations for 47 CFR part

101 licenses will be accepted in the 18.3-18.58 GHz band. After June 8, 2000, no applications for new stations for 47 CFR part 101 licenses will be accepted in the 18.58-19.3 GHz band. Licensees, except 24 GHz band licensees, may use either a two-way link or one frequency of a frequency pair for a one-way link and must coordinate proposed operations pursuant to the procedures required in §101.103 of this subpart. (Note, however, that stations authorized as of September 9, 1983, to use frequencies in the band 17.7-19.7 GHz may, upon proper application, continue to be authorized for such operations, consistent with the above conditions related to the 18.58-19.3 GHz band.) Applicants for one-way spectrum from 17.7-18.58 GHz for multichannel video programming distribution are governed by paragraph (r)(6) of this section. Licensees are also allowed to use one-way (unpaired) channels in the 17.7-17.74 GHz sub-band to pair with other channels in the FS portions of the 18 GHz band where, for example, the return pair is already in use and therefore blocked or in TDD systems. Stations used for MVPD operations in the 17.7-17.8 GHz band must coordinate with the Federal Government before operating in the zones specified in §1.924(e) of this chapter.

(1) 1.25 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
17700.625	NA
17701.875	NA
17703.125	NA
17704.375	NA
17705.625	NA
17706.875	NA
17708.125	NA
17709.375	NA
17710.625	NA
17711.875	NA
17713.125	NA
17714.375	NA
17715.625	NA
17716.875	NA
17718.125	NA
17719.375	NA
17721.625	NA
17722.875	NA
17723.125	NA
17724.375	NA
17725.625	NA
17726.875	NA
17728.125	NA
17729.375	NA
17730.625	NA
17731.875	NA
17733.125	NA
17734.375	NA
17735.625	NA
17736.875	NA
17738.125	NA
17739.375	NA
18060.625	19620.625
18061.875	19621.875
18063.125	19623.125
18064.375	19624.375

18065.625	19625.625
18066.875	19626.875
18068.125	19628.125
18069.375	19629.375
18070.625	19630.625
18071.875	19631.875
18073.125	19633.125
18074.375	19634.375
18075.625	19635.625
18076.875	19636.875
18078.125	19638.125
18079.375	19639.375
18080.625	19640.625
18081.875	19641.875
18083.125	19643.125
18084.375	19644.375
18085.625	19645.625
18086.875	19646.875
18088.125	19648.125
18089.375	19649.375
18090.625	19650.625
18091.875	19651.875
18093.125	19653.125
18094.375	19654.375
18095.625	19655.625
18096.875	19656.875
18098.125	19658.125
18099.375	19659.375
18100.625	19660.625
18101.875	19661.875
18103.125	19663.125
18104.375	19664.375
18105.625	19665.625
18106.875	19666.875
18108.125	19668.125
18109.375	19669.375
18110.625	19670.625
18111.875	19671.875
18113.125	19673.125
18114.375	19674.375
18115.625	19675.625
18116.875	19676.875
18118.125	19678.125
18119.375	19679.375
18120.625	19680.625
18121.875	19681.875
18123.125	19683.125
18124.375	19684.375
18125.625	19685.625
18126.875	19686.875
18128.125	19688.125
18129.375	19689.375

18130.625	19690.625
18131.875	19691.875
18133.125	19693.125
18134.375	19694.375
18135.625	19695.625
18136.875	19696.875
18138.125	19698.125
18139.375	19699.375

(2) 2 Megahertz maximum authorized bandwidth channel:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
18141.0	N/A

(3) 2.5 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
17701.25	N/A
17703.75	N/A
17706.25	N/A
17708.75	N/A
17711.25	N/A
17713.75	N/A
17716.25	N/A
17718.75	N/A
17721.25	N/A
17723.75	N/A
17726.25	N/A
17728.75	N/A
17731.25	N/A
17733.75	N/A
17736.25	N/A
17738.75	N/A
18061.25	19621.25
18063.75	19623.75
18066.25	19626.25
18068.75	19628.75
18071.25	19631.25
18073.75	19633.75
18076.25	19636.25
18078.75	19638.75
18081.25	19641.25
18083.75	19643.75
18086.25	19646.25
18088.75	19648.75
18091.25	19651.25
18093.75	19653.75
18096.25	19656.25
18098.75	19658.75
18101.25	19661.25
18103.75	19663.75
18106.25	19666.25

18108.75	19668.75
18111.25	19671.25
18113.75	19673.75
18116.25	19676.25
18118.75	19678.75
18121.25	19681.25
18123.75	19683.75
18126.25	19686.25
18128.75	19688.75
18131.25	19691.25
18133.75	19693.75
18136.25	19696.25
18138.75	19698.75

(4) 5 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
340 Megahertz Separation (* channels are no longer available on a primary basis)	
18762.5*	19102.5*
18767.5*	19107.5*
18772.5*	19112.5*
18777.5*	19117.5*
18782.5*	19122.5*
18787.5*	19127.5*
18792.5*	19132.5*
18797.5*	19137.5*
18802.5*	19142.5*
18807.5*	19147.5*
18812.5*	19152.5*
18817.5*	19157.5*

(5) 5 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1560 Megahertz Separation	
17702.5	N/A
17707.5	N/A
17712.5	N/A
17717.5	N/A
17722.5	N/A
17727.5	N/A
17732.5	N/A
17737.5	N/A
18062.5	19622.5
18067.5	19627.5
18072.5	19632.5
18077.5	19637.5
18082.5	19642.5
18087.5	19647.5
18092.5	19652.5

18097.5	19657.5
18102.5	19662.5
18107.5	19667.5
18112.5	19672.5
18117.5	19677.5
18122.5	19682.5
18127.5	19687.5
18132.5	19692.5
18137.5	19697.5

(6) MVPD use: Multichannel video programming distributors (MVPDs) can use any size channels for one-way operations in the 17.7-18.58 GHz band for any permissible communications specified for this band in §101.603 provided that they have coordinated the appropriate emission designators and power, but must request contiguous spectrum (minus spectrum that is already licensed or prior coordinated in the area and thus blocked). MVPD systems must meet the efficiency requirements of §101.141. Spectrum at 18.3-18.58 GHz is only available for grandfathered stations. See §101.85.

(7) 10 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1560 Megahertz Separation (* channels are no longer available on a primary basis)	
17705.0	19265.0*
17715.0	19275.0*
17725.0	19285.0*
17735.0	19295.0*
17745.0	19305.0
17755.0	19315.0
17765.0	19325.0
17775.0	19335.0
17785.0	19345.0
17795.0	19355.0
17805.0	19365.0
17815.0	19375.0
17825.0	19385.0
17835.0	19395.0
17845.0	19405.0
17855.0	19415.0
17865.0	19425.0
17875.0	19435.0
17885.0	19445.0
17895.0	19455.0
17905.0	19465.0
17915.0	19475.0
17925.0	19485.0
17935.0	19495.0
17945.0	19505.0
17955.0	19515.0
17965.0	19525.0
17975.0	19535.0
17985.0	19545.0
17995.0	19555.0

18005.0	19565.0
18015.0	19575.0
18025.0	19585.0
18035.0	19595.0
18045.0	19605.0
18055.0	19615.0
18065.0	19625.0
18075.0	19635.0
18085.0	19645.0
18095.0	19655.0
18105.0	19665.0
18115.0	19675.0
18125.0	19685.0
18135.0	19695.0
340 Megahertz Separation	
18585.0*	18925.0*
18595.0*	18935.0*
18605.0*	18945.0*
18615.0*	18955.0*
18625.0*	18965.0*
18635.0*	18975.0*
18645.0*	18985.0*
18655.0*	18995.0*
18665.0*	19005.0*
18675.0*	19015.0*
18685.0*	19025.0*
18695.0*	19035.0*
18705.0*	19045.0*
18715.0*	19055.0*
18725.0*	19065.0*
18735.0*	19075.0*
18745.0*	19085.0*
18755.0*	19095.0*
18765.0*	19105.0*
18775.0*	19115.0*
18785.0*	19125.0*
18795.0*	19135.0*
18805.0*	19145.0*
18815.0*	19155.0*

(8) 20 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1560 Megahertz Separation (* channels are no longer available on a primary basis)	
17710.0	19270.0*
17730.0	19290.0*
17750.0	19310.0
17770.0	19330.0
17790.0	19350.0
17810.0	19370.0

17830.0	19390.0
17850.0	19410.0
17870.0	19430.0
17890.0	19450.0
17910.0	19470.0
17930.0	19490.0
17950.0	19510.0
17970.0	19530.0
17990.0	19550.0
18010.0	19570.0
18030.0	19590.0
18050.0	19610.0
18070.0	19630.0
18090.0	19650.0
18110.0	19670.0
18130.0	19690.0
340 Megahertz Separation	
18590.0*	18930.0*
18610.0*	18950.0*
18630.0*	18970.0*
18650.0*	18990.0*
18670.0*	19010.0*
18690.0*	19030.0*
18710.0*	19050.0*
18730.0*	19070.0*
18750.0*	19090.0*
18770.0*	19110.0*
18790.0*	19130.0*
18810.0*	19150.0*

(9) 30 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
1560 Megahertz Separation	
17715.0	N/A
17755.0	19315.0
17785.0	19345.0
17815.0	19375.0
17845.0	19405.0
17875.0	19435.0
17905.0	19465.0
17935.0	19495.0
17965.0	19525.0
17995.0	19555.0
18025.0	19585.0
18055.0	19615.0
18085.0	19645.0
18115.0	19675.0

(10) 40 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**

1560 Megahertz Separation (*channels are no longer available on a primary basis)	
17720.0	19280.0*
17760.0	19320.0
17800.0	19360.0
17840.0	19400.0
17880.0	19440.0
17920.0	19480.0
17960.0	19520.0
18000.0	19560.0
18040.0	19600.0
18080.0	19640.0
18120.0	19680.0

(11) 50 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
1560 Megahertz Separation	
17765.0	19325.0
17815.0	19375.0
17865.0	19425.0
17915.0	19475.0
17965.0	19525.0
18015.0	19575.0
18065.0	19625.0
18115.0	19675.0

(12) 80 Megahertz maximum authorized bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
1560 Megahertz Separation (* channels are no longer available on a primary basis)	
17740.0	19300.0*
17820.0	19380.0
17900.0	19460.0
17980.0	19540.0
18060.0	19620.0

(13) The following frequencies on channels 35-39 are available for point-to-multipoint systems and are available by geographic area licensing in the 24 GHz Service to be used as the licensee desires. The 24 GHz spectrum can be aggregated or disaggregated and does not have to be used in the transmit/receive manner shown except to comply with international agreements along the U.S. borders. Channels 35 through 39 are licensed in the 24 GHz Service by Economic Areas for any digital fixed service. Channels may be used at either nodal or subscriber station locations for transmit or receive but must be coordinated with adjacent channel and adjacent area users in accordance with the provisions of §101.509 of this subpart. Stations also must comply with international coordination agreements.

Channel No.	Nodal station frequency band (MHz) limits	User station frequency band (MHz) limits
(* channels are no longer available on a primary basis)		
25	18,820-18,830	19,160-19,170*

26	18,830-18,840	19,170-19,180*
27	18,840-18,850	19,180-19,190*
28	18,850-18,860	19,190-19,200*
29	18,860-18,870	19,200-19,210*
30	18,870-18,880	19,210-19,220*
31	18,880-18,890	19,220-19,230*
32	18,890-18,900	19,230-19,240*
33	18,900-18,910	19,240-19,250*
34	18,910-18,920	19,250-19,260*
35	24,250-24,290	25,050-25,090
36	24,290-24,330	25,090-25,130
37	24,330-24,370	25,130-25,170
38	24,370-24,410	25,170-25,210
39	24,410-24,450	25,210-25,250

(14) *Special provision for low power systems in the 17,700-19,700 MHz band:* Notwithstanding other provisions in 47 CFR part 101 and except for specified areas around Washington, DC, and Denver, Colorado, licensees of point-to-multipoint channel pairs 25-29 identified in paragraph (r)(13) of this section may continue to operate in accordance with the requirements of §101.85 and may operate multiple low power transmitting devices within a defined service area. Operations are prohibited within 55 km when used outdoor and within 20 km when used indoor of the coordinates 38 deg.48′ N/76 deg.52′ W (Washington, DC area) and 39 deg.43′ N/104 deg.46′ W (Denver, Colorado area). The service area will be a 28 kilometer omni directional radius originating from specified center reference coordinates. The specified center coordinates must be no closer than 56 kilometers from any co-channel nodal station or the specified center coordinates of another co-channel system. Applicants/licensees do not need to specify the location of each individual transmitting device operating within their defined service areas. Such operations are subject to the following requirements on the low power transmitting devices:

(i) Power must not exceed one watt EIRP and 100 milliwatts transmitter output power;

(ii) A frequency tolerance of 0.001% must be maintained; and

(iii) The mean power of emissions shall be attenuated in accordance with the following schedule:

(A) In any 4 kHz band, the center frequency of which is removed from the center frequency of the assigned channel by more than 50 percent of the channel bandwidth and is within the bands 18,820-18,870 MHz or 19,160-19,210 MHz:

$A = 35 + .003 (F-0.5B)$ dB

or,

80 dB (whichever is the lesser attenuation).

Where:

A = Attenuation (in decibels) below output power level contained within the channel for a given polarization.

B = Bandwidth of channel in kHz.

F = Absolute value of the difference between the center frequency of the 4 kHz band measured at the center frequency of the channel in kHz.

(B) In any 4 kHz band the center frequency of which is outside the bands 18.820-18.870 GHz: At least 43 + 10 log P (mean output power in watts) decibels.

(iv) Low power stations authorized in the band 18.8-19.3 GHz after June 8, 2000, are restricted to indoor use only. No new licenses will be authorized for applications received after April 1, 2002.

(s) *21,200 to 23,600 MHz:* 50 MHz authorized bandwidth.

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
(1) 2.5 MHz bandwidth channels:	
21601.25	22801.25
21603.75	22803.75
21606.25	22806.25
21608.75	22808.75
21611.25	22811.25
21613.75	22813.75
21616.25	22816.25
21618.75	22818.75
21621.25	22821.25
21623.75	22823.75
21626.25	22826.25
21628.75	22828.75
21631.25	22831.25
21633.75	22833.75
21636.25	22836.25
21638.75	22838.75
21641.25	22841.25
21643.75	22843.75
21646.25	22846.25
21648.75	22848.75
21651.25	22851.25
21653.75	22853.75
21656.25	22856.25
21658.75	22858.75
21661.25	22861.25
21663.75	22863.75

21666.25	22866.25
21668.75	22868.75
21671.25	22871.25
21673.75	22873.75
21676.25	22876.25
21678.75	22878.75
21681.25	22881.25
21683.75	22883.75
21686.25	22886.25
21688.75	22888.75
21691.25	22891.25
21693.75	22893.75
21696.25	22896.25
21698.75	22898.75
21701.25	22901.25
21703.75	22903.75
21706.25	22906.25
21708.75	22908.75
21711.25	22911.25
21713.75	22913.75
21716.25	22916.25
21718.75	22918.75
21721.25	22921.25
21723.75	22923.75
21726.25	22926.25
21728.75	22928.75
21731.25	22931.25
21733.75	22933.75
21736.25	22936.25
21738.75	22938.75
21741.25	22941.25
21743.75	22943.75
21746.25	22946.25

21748.75	22948.75
21751.25	22951.25
21753.75	22953.75
21756.25	22956.25
21758.75	22958.75
21761.25	22961.25
21763.75	22963.75
21766.25	22966.25
21768.75	22968.75
21771.25	22971.25
21773.75	22973.75
21776.25	22976.25
21778.75	22978.75
21781.25	22981.25
21783.75	22983.75
21786.25	22986.25
21788.75	22988.75
21791.25	22991.25
21793.75	22993.75
21796.25	22996.25
21798.75	22998.75
22301.25	23501.25
22303.75	23503.75
22306.25	23506.25
22308.75	23508.75
22311.25	23511.25
22313.75	23513.75
22316.25	23516.25
22318.75	23518.75
22321.25	23521.25
22323.75	23523.75
22326.25	23526.25
22328.75	23528.75

22331.25	23531.25
22333.75	23533.75
22336.25	23536.25
22338.75	23538.75
22341.25	23541.25
22343.75	23543.75
22346.25	23546.25
22348.75	23548.75
22351.25	23551.25
22353.75	23553.75
22356.25	23556.25
22358.75	23558.75
22361.25	23561.25
22363.75	23563.75
22366.25	23566.25
22368.75	23568.75
22371.25	23571.25
22373.75	23573.75
22376.25	23576.25
22378.75	23578.75
22381.25	23581.25
22383.75	23583.75
22386.25	23586.25
22388.75	23588.75
22391.25	23591.25
22393.75	23593.75
22396.25	23596.25
22398.75	23598.75
(2) 5 MHz bandwidth channels:	
21602.5	22802.5
21607.5	22807.5
21612.5	22812.5
21617.5	22817.5
21622.5	22822.5

21627.5	22827.5
21632.5	22832.5
21637.5	22837.5
21642.5	22842.5
21647.5	22847.5
21652.5	22852.5
21657.5	22857.5
21662.5	22862.5
21667.5	22867.5
21672.5	22872.5
21677.5	22877.5
21682.5	22882.5
21687.5	22887.5
21692.5	22892.5
21697.5	22897.5
21702.5	22902.5
21707.5	22907.5
21712.5	22912.5
21717.5	22917.5
21722.5	22922.5
21727.5	22927.5
21732.5	22932.5
21737.5	22937.5
21742.5	22942.5
21747.5	22947.5
21752.5	22952.5
21757.5	22957.5
21762.5	22962.5
21767.5	22967.5
21772.5	22972.5
21777.5	22977.5
21782.5	22982.5
21787.5	22987.5

21792.5	22992.5
21797.5	22997.5
22302.5	23502.5
22307.5	23507.5
22312.5	23512.5
22317.5	23517.5
22322.5	23522.5
22327.5	23527.5
22332.5	23532.5
22337.5	23537.5
22342.5	23542.5
22347.5	23547.5
22352.5	23552.5
22357.5	23557.5
22362.5	23562.5
22367.5	23567.5
22372.5	23572.5
22377.5	23577.5
22382.5	23582.5
22387.5	23587.5
22392.5	23592.5
22397.5	23597.5
(3) 10 MHz bandwidth channels:	
21205	22405
21215	22415
21225	22425
21235	22435
21245	22445
21255	22455
21265	22465
21275	22475
21285	22485
21295	22495
21305	22505

21315	22515
21325	22525
21335	22535
21345	22545
21355	22555
21365	22565
21375	22575
21385	22585
21395	22595
21405	22605
21415	22615
21425	22625
21435	22635
21445	22645
21455	22655
21465	22665
21475	22675
21485	22685
21495	22695
21505	22705
21515	22715
21525	22725
21535	22735
21545	22745
21555	22755
21565	22765
21575	22775
21585	22785
21595	22795
21605[1]	[1]22805
21615[1]	[1]22815
21625[1]	[1]22825
21635[1]	[1]22835

21645[1]	[1]22845
21655[1]	[1]22855
21665[1]	[1]22865
21675[1]	[1]22875
21685[1]	[1]22885
21695[1]	[1]22895
21705[1]	[1]22905
21715[1]	[1]22915
21725[1]	[1]22925
21735[1]	[1]22935
21745[1]	[1]22945
21755[1]	[1]22955
21765[1]	[1]22965
21775[1]	[1]22975
21785[1]	[1]22985
21795[1]	[1]22995
21805[2]	[2]23005
21815[2]	[2]23015
21825[2]	[2]23025
21835[2]	[2]23035
21845[2]	[2]23045
21855[2]	[2]23055
21865[2]	[2]23065
21875[2]	[2]23075
21885[2]	[2]23085
21895[2]	[2]23095
21905[2]	[2]23105
21915[2]	[2]23115
21925[2]	[2]23125
21935[2]	[2]23135
21945[2]	[2]23145
21955[2]	[2]23155
21965[2]	[2]23165

21975[2]	[2]23175
21985[2]	[2]23185
21995[2]	[2]23195
22005	23205
22015	23215
22025[2]	23225[2]
22035	23235
22045	23245
22055	23255
22065	23265
22075[2]	23275[2]
22085	23285
22095	23295
22105	23305
22115	23315
22125	23325
22135	23335
22145	23345
22155	23355
22165	23365
22175	23375
22185	23385
22195	23395
22205	23405
22215	23415
22225	23425
22235	23435
22245	23445
22255	23455
22265	23465
22275	23475
22285	23485
22295	23495
22305[1]	[1]23505

22315[1]	[1]23515
22325[1]	[1]23525
22335[1]	[1]23535
22345[1]	[1]23545
22355[1]	[1]23555
22365[1]	[1]23565
22375[1]	[1]23575
22385[1]	[1]23585
22395[1]	[1]23595
(4) 20 MHz bandwidth channels:	
21210	22410
21230	22430
21260	22460
21280	22480
21310	22510
21330	22530
21360	22560
21380	22580
21410	22610
21430	22630
21460	22660
21480	22680
21510	22710
21530	22730
21560	22760
21580	22780
21610[1]	[1]22810
21630[1]	[1]22830
21660[1]	[1]22860
21680[1]	[1]22880
21710[1]	[1]22910
21730[1]	[1]22930
21760[1]	[1]22960
21780[1]	[1]22980

21810[2]	[2]23010
21830[2]	[2]23030
21860[2]	[2]23060
21880[2]	[2]23080
21910[2]	[2]23110
21930[2]	[2]23130
21960[2]	[2]23160
21980[2]	[2]23180
22010	23210
22030	23230
22060	23260
22080	23280
22110	23310
22130	23330
22160	23360
22180	23380
22210	23410
22230	23430
22260	23460
22280	23480
22310[1]	[1]23510
22330[1]	[1]23530
22360[1]	[1]23560
22380[1]	[1]23580
(5) 30 MHz bandwidth channels:	
21235	22435
21285	22485
21335	22535
21385	22585
21435	22635
21485	22685
21535	22735
21585	22785
21635[1]	[1]22835

21685[1]	[1]22885
21735[1]	[1]22935
21785[1]	[1]22985
21835[2]	[2]23035
21885[2]	[2]23085
21935[2]	[2]23135
21985[2]	[2]23185
22035	23235
22085	23285
22135	23335
22185	23385
22235	23435
22285	23485
22335[1]	[1]23535
22385[1]	[1]23585
(6) 40 MHz bandwidth channels:	
21220	22420
21270	22470
21320	22520
21370	22570
21420	22620
21470	22670
21520	22720
21570	22770
21620[1]	[1]22820
21670[1]	[1]22870
21720[1]	[1]22920
21770[1]	[1]22970
21820[2]	[2]23020
21870[2]	[2]23070
21920[2]	[2]23120
21970[2]	[2]23170
22020	23220
22070	23270

22120	23320
22170	23370
22220	23420
22270	23470
22320[1]	[1]23520
22370[1]	[1]23570
(7) 50 MHz bandwidth channels:	
21225	22425
21275	22475
21325	22525
21375	22575
21425	22625
21475	22675
21525	22725
21575	22775
21625[1]	[1]22825
21675[1]	[1]22875
21725[1]	[1]22925
21775[1]	[1]22975
21825[2]	[2]23025
21875[2]	[2]23075
21925[2]	[2]23125
21975[2]	[2]23175
22025	23225
22075	23275
22125	23325
22175	23375
22025[2]	23225[2]
22075[2]	23275[2]
22325[1]	[1]23525
22375[1]	[1]23575

[1]Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

[2]These frequencies may be assigned to low power systems, as defined in paragraph (8) of this section.

(8) *Special provisions for low power, limited coverage systems in the 21.8-22.0 GHz and 23.0-23.2 GHz band segments.* Notwithstanding any contrary provisions in this part, the frequency band segment 21.8-22.0 GHz paired with the frequency band segment 23.0-23.2 GHz may be authorized for low power, limited coverage systems subject to the following provisions:

(i) The maximum EIRP shall be 55 dBm and the rated transmitter output power shall not exceed 0.100 Watts;

(ii) In the band segments from 21.8-22.0 GHz and 23.0-23.2 GHz, the frequency tolerance for stations authorized on or before April 1, 2005 is 0.05%. Existing licensees and pending applicants on that date may continue to operate after that date with a frequency tolerance of 0.05%, provided that it does not cause harmful interference to the operation of any other licensee. The frequency tolerance of §101.107(a) shall apply to stations applied for after April 1, 2005;

(iii) The maximum beamwidth shall not exceed 4 degrees;

(iv) The sidelobe suppression criteria contained in §101.115 of this part shall not apply, except that a minimum front-to-back ratio of 38 dB shall apply;

(v) Upon showing of need, a maximum bandwidth of 50 MHz may be authorized per frequency assigned;

(vi) Radio systems authorized under the provisions of this section shall have no more than five hops in tandem, except upon showing of need, but in any event the maximum tandem length shall not exceed 40 km (25 miles);

(vii) Interfering signals at the antenna terminals of station authorized under this section shall not exceed −90 dBm and −70 dBm respectively, for co-channel and adjacent channel interfering signals; and

(viii) Stations authorized under the provisions of this section shall provide the protection from interference specified in §101.105 to stations operating in accordance with the provisions of this part.

(t) *27,500-28,350; 29,100-29,250; 31,000-31,300 MHz.* These frequencies are available for LMDS systems. Each assignment will be made on a BTA service area basis, and the assigned spectrum may be subdivided as desired by the licensee.

(u) *31,000-31,300 MHz.* Stations licensed in this band prior to March 11, 1997, may continue their authorized operations, subject to license renewal, on the condition that harmful interference will not be caused to LMDS operations licensed in this band after June 30, 1997. Non-LMDS stations licensed after March 11, 1997, based on applications refiled no later than June 26, 1998 are unprotected and subject to harmful interference from each other and from stations licensed prior to March 11, 1997, and are licensed on a secondary basis to LMDS. In the sub-bands 31,000-31,075 MHz and 31,225-31,300 MHz, stations initially licensed prior to March 11, 1997, except in LTTS, and LMDS operations authorized after June 30, 1997, are equally protected against harmful interference from each other in accordance with the provisions of §101.103(b). For stations, except in LTTS, permitted to relocate to these sub-bands, the following paired frequencies are available:

Transmit (receive) (MHz)	**Receive (transmit) (MHz)**
(1) 25 MHz Authorized Bandwidth Channels	

31,012.5	31,237.5
31,037.5	31,262.5
31,062.5	31,287.5
(2) 75 MHz Authorized Bandwidth Channel	
31,037.5	31,275.0

NOTE TO (u): These channels are assigned for use within a rectangular service area to be described in the application by the maximum and minimum latitudes and longitudes. Such service area must be as small as practical consistent with the local service requirements of the carrier. These frequency plans may be subdivided as desired by the licensee and used within the service area as desired without further authorization subject to the terms and conditions set forth in §101.149. These frequencies may be assigned only where it is shown that the applicant will have reasonable projected requirements for a multiplicity of service points or transmission paths within the area.

(v)(1) Assignments in the band 38,600-40,000 MHz must be according to the following frequency plan:

Channel Group A		**Channel Group B**	
Channel No.	**Frequence band limits (MHz)**	**Channel No.**	**Frequency band limits (MHz)**
1-A	38,600-38,650	1-B	39,300-39,350
2-A	38,650-38,700	2-B	39,350-39,400
3-A	38,700-38,750	3-B	39,400-39,450
4-A	38,750-38,800	4-B	39,450-39,500
5-A	38,800-38,850	5-B	39,500-39,550
6-A	38,850-38,900	6-B	39,550-39,600
7-A	38,900-38,950	7-B	39,600-39,650
8-A	38,950-39,000	8-B	39,650-39,700
9-A	39,000-39,050	9-B	39,700-39,750
10-A	39,050-39,100	10-B	39,750-39,800
11-A	39,100-39,150	11-B	39,800-39,850
12-A	39,150-39,200	12-B	39,850-39,900
13-A	39,200-39,250	13-B	39,900-39,950
14-A	39,250-39,300	14-B	39,950-40,000

(v)(2) Channels Blocks 1 through 14 are assigned for use within Economic Areas (EAs). Applicants are to apprise themselves of any licensed rectangular service areas within the EA for which they seek a license and comply with the requirements set forth in §101.103. All of the channel blocks may be subdivided as desired by the licensee and used within its service area as desired without further authorization subject to the terms and conditions set forth in §101.149.

(w) Fixed systems licensed, in operation, or applied for in the 3,700-4,200, 5925-6425, 6,525-6,875, 10,550-10,680, and 10,700-11,700 MHz bands prior to July 15, 1993, are permitted to use channel plans in effect prior to that date, including adding channels under those plans.

(x) Operations on other than the listed frequencies may be authorized where it is shown that the objectives or requirements of the interference criteria prescribed in §101.105 could not otherwise be met to resolve the interference problems.

(y) *Special requirements for operations in the band 29.1-29.25 GHz.* (1)(i) LMDS receive stations operating on frequencies in the 29.1-29.25 GHz band within a radius of 75 nautical miles of the geographic coordinates provided by a non-GSO MSS licensee pursuant to paragraphs (c)(2) or (c)(3)(i) of this section (the “feeder link earth station complex protection zone”) shall accept any interference

caused to them by such earth station complexes and shall not claim protection from such earth station complexes.

(ii) LMDS licensees operating on frequencies in the 29.1-29.25 GHz band outside a feeder link earth station complex protection zone shall cooperate fully and make reasonable efforts to resolve technical problems with the non-GSO MSS licensee to the extent that transmissions from the non-GSO MSS operator's feeder link earth station complex interfere with an LMDS receive station.

(2) No more than 15 days after the release of a public notice announcing the commencement of LMDS auctions, feeder link earth station complexes to be licensed pursuant to Section 25.257 shall be specified by a set of geographic coordinates in accordance with the following requirements: no feeder link earth station complex may be located in the top eight (8) metropolitan statistical areas (“MSAs”), ranked by population, as defined by the Office of Management and Budget as of June 1993, using estimated populations as of December 1992; two (2) complexes may be located in MSAs 9 through 25, one of which must be Phoenix, AZ (for a complex at Chandler, AZ); two (2) complexes may be located in MSAs 26 to 50; three (3) complexes may be located in MSAs 51 to 100, one of which must be Honolulu, Hawaii (for a complex at Waimea); and the three (3) remaining complexes must be located at least 75 nautical miles from the borders of the 100 largest MSAs or in any MSA not included in the 100 largest MSAs. Any location allotted for one range of MSAs may be taken from an MSA below that range.

(3)(i) Any non-GSO MSS licensee may at any time specify sets of geographic coordinates for feeder link earth station complexes with each earth station contained therein to be located at least 75 nautical miles from the borders of the 100 largest MSAs.

(ii) For purposes of paragraph (c)(3)(i) of this section, non-GSO MSS feeder link earth station complexes shall be entitled to accommodation only if the affected non-GSO MSS licensee preapplies to the Commission for a feeder link earth station complex or certifies to the Commission within sixty days of receiving a copy of an LMDS application that it intends to file an application for a feeder link earth station complex within six months of the date of receipt of the LMDS application.

(iii) If said non-GSO MSS licensee application is filed later than six months after certification to the Commission, the LMDS and non-GSO MSS entities shall still cooperate fully and make reasonable efforts to resolve technical problems, but the LMDS licensee shall not be obligated to re-engineer its proposal or make changes to its system.

(4) LMDS licensees or applicants proposing to operate hub stations on frequencies in the 29.1-29.25 GHz band at locations outside of the 100 largest MSAs or within a distance of 150 nautical miles from a set of geographic coordinates specified under paragraph (c)(2) or (c)(3)(i) of this section shall serve copies of their applications on all non-GSO MSS applicants, permitees or licensees meeting the criteria specified in §25.257(a). Non-GSO MSS licensees or applicants shall serve copies of their feeder link earth station applications, after the LMDS auction, on any LMDS applicant or licensee within a distance of 150 nautical miles from the geographic coordinates that it specified under paragraph (c)(2) or (c)(3)(i) of this section. Any necessary coordination shall commence upon notification by the party receiving an application to the party who filed the application. The results of any such coordination shall be reported to the Commission within sixty days. The non-GSO MSS earth station licensee shall also provide all such LMDS licensees with a copy of its channel plan.

(z) *71,000-76,000 MHz; 81,000-86,000 MHz; 92,000-94,000 MHz; 94,100-95,000 MHz.* (1) Those applicants who are approved in accordance with FCC Form 601 will each be granted a single, non-exclusive nationwide license. Site-by-site registration is on a first-come, first-served basis. Registration will be in the Universal Licensing System until the Wireless Telecommunications Bureau announces by public notice, the implementation of a third-party database. *See* 47 CFR 101.1523. Links may not

operate until NTIA approval is received. Licensees may use these bands for any point-to-point non-broadcast service.

(2) Prior links shall be protected using the interference protection criteria set forth in section 101.105. For transmitters employing digital modulation techniques and operating in the 71,000-76,000 MHz or 81,000-86,000 MHz bands, the licensee must construct a system that meets a minimum bit rate of 0.125 bits per second per Hertz of bandwidth. For transmitters that operate in the 92,000-94,000 MHz or 94,100-95,000 MHz bands, licensees must construct a system that meets a minimum bit rate of 1.0 bit per second per Hertz of bandwidth. If it is determined that a licensee has not met these loading requirements, then the database will be modified to limit coordination rights to the spectrum that is loaded and the licensee will lose protection rights on spectrum that has not been loaded.

[61 FR 26677, May 28, 1996]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §101.147, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov.*

§101.149 Special requirements for operation in the band 38,600-40,000 MHz

Assigned frequency channels in the band 38,600-40,000 MHz may be subdivided and used anywhere in the authorized service area, subject to the following terms and conditions:

(a) No interference may be caused to a previously existing station operating in another authorized service area;

(b) Each operating station must have posted a copy of the service area authorization; and

(c) The antenna structure height employed at any location may not exceed the criteria set forth in §17.7 of this chapter unless, in each instance, authorization for use of a specific maximum antenna structure for each location has been obtained from the FAA prior to the erection of the antenna.

§101.151 Use of signal boosters.

Private operational-fixed licensees authorized to operate multiple address systems in the 928-929/952-960 MHz and 932-932.5/941-941.5 MHz bands may employ signal boosters at fixed locations in accordance with the following criteria:

(a) The amplified signal is retransmitted only on the exact frequency(ies) of the originating base, fixed, mobile, or portable station(s). The booster will fill in only weak signal areas and cannot extend the system's normal signal coverage area.

(b) Class A narrowband signal boosters must be equipped with automatic gain control circuitry which will limit the total effective radiated power (ERP) of the unit to a maximum of 5 watts under all conditions. Class B broadband signal boosters are limited to 5 watts ERP for each authorized frequency that the booster is designed to amplify.

(c) Class A narrowband boosters must meet the out-of-band emission limits of §101.111 for each narrowband channel that the booster is designed to amplify. Class B broadband signal boosters must meet the emission limits of §101.111 for frequencies outside of the booster's design passband.

(d) Class B broadband signal boosters are permitted to be used only in confined or indoor areas such as buildings, tunnels, underground areas, etc., or remote areas, *i.e.,* areas where there is little or no risk of interference to other users.

(e) The licensee is given authority to operate signal boosters without separate authorization from the Commission. Certificated equipment must be employed and the licensee must ensure that all applicable rule requirements are met.

(f) Licensees employing either Class A narrowband or Class B broadband signal boosters as defined in §101.3 are responsible for correcting any harmful interference that the equipment may cause to other systems.

[61 FR 31052, June 19, 1996, as amended at 63 FR 36611, July 7, 1998]

Subpart D—Operational Requirements

§101.201 Station inspection.

The licensee of each station authorized in the radio services included in this part must make the station available for inspection by representatives of the Commission at any reasonable hour.

§101.203 Communications concerning safety of life and property.

(a) Handling and transmission of messages concerning the safety of life or property which is in imminent danger must be afforded priority over other messages.

(b) No person may knowingly cause to be transmitted any false or fraudulent message concerning the safety of life or property, or refuse upon demand immediately to relinquish the use of a radio circuit to enable the transmission of messages concerning the safety of life or property which is in imminent danger, or knowingly interfere or otherwise obstruct the transmission of such messages.

§101.205 Operation during emergency.

The licensee of any station in these services may, during a period of emergency in which normal communication facilities are disrupted as a result of hurricane, flood, earthquake, or similar disaster, utilize such station for emergency communication service in a manner other than that specified in the instrument of authorization: Provided:

(a) That as soon as possible after the beginning of such emergency use, notice be sent to the Commission stating the nature of the emergency and the use to which the station is being put;

(b) That the emergency use of the station must be discontinued as soon as substantially normal communication facilities are again available;

(c) That the Commission must be notified immediately when such special use of the station is terminated;

(d) That, in no event, will any station engage in emergency transmission on frequencies other than, or with power in excess of, that specified in the instrument of authorization or as otherwise expressly provided by the Commission, or by law; and

(e) That the Commission may, at any time, order the discontinuance of any such emergency communication.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68983, Dec. 14, 1998]

§101.207 Suspension of transmission.

Transmission must be suspended immediately upon detection by the station or operator licensee or upon notification by the Commission of a deviation from the technical requirements of the station authorization and must remain suspended until such deviation is corrected, except for transmission concerning the immediate safety of life or property, in which case transmission must be suspended immediately after the emergency is terminated.

§101.209 Operation of stations at temporary fixed locations for communication between the United States and Canada or Mexico.

Stations authorized to operate at temporary fixed locations may not be used for transmissions between the United States and Canada, or the United States and Mexico, without prior specific notification to, and authorization from, the Commission. Notification of such intended usage of the facilities should include a detailed showing of the operation proposed, including the parties involved, the nature of the communications to be handled, the terms and conditions of such operations, the time and place of operation, such other matters as the applicant deems relevant, and a showing as to how the public interest, convenience and necessity would be served by the proposed operation. Such notification should be given sufficiently in advance of the proposed date of operation to permit any appropriate correlation with the respective foreign government involved (see §§101.31, 101.811, 101.813, and 101.815).

§101.211 Operator requirements.

(a) Any person, with the consent or authorization of the licensee, may employ stations in this service for the purpose of telecommunications in accordance with the conditions and limitations set forth in §101.135.

(b) The station licensee is responsible for the proper operation of the station at all times and is expected to provide for observations, servicing and maintenance as often as may be necessary to ensure proper operation.

(c) The provisions of paragraph (a) of this section may not be construed to change or diminish in any respect the responsibility of station licensees to have and to maintain control over the stations licensed to them (including all transmitter units thereof), or for the proper functioning and operation of those stations (including all transmitter units thereof) in accordance with the terms of the licenses of those stations.

§101.213 Station identification.

Stations in these services are exempt from the requirement to identify transmissions by call sign or any other station identifier.

§101.215 Posting of station authorization and transmitter identification cards, plates, or signs.

(a) Each licensee shall post at the station the name, address and telephone number of the custodian of the station license or other authorization if such license or authorization is not maintained at the station.

(b) The requirements in paragraph (a) of this section do not apply to remote stations using frequencies listed in §101.147(b).

§101.217 Station records.

Each licensee of a station subject to this part shall maintain records in accordance with the following:

(a) For all stations, the results and dates of transmitter measurements and the name of the person or persons making the measurements;

(b) For all stations, when service or maintenance duties are performed, which may affect their proper operation, the responsible operator shall sign and date an entry in the station record concerned, giving:

(1) Pertinent details of all transmitter adjustments performed by him or under his supervision; and

(2) His name and address, provided that this information, so long as it remains unchanged, is not required to be repeated in the case of a person who is regularly employed as operator on a full-time basis at the station.

(c) The records shall be kept in an orderly manner, and in such detail that the data required are readily available. Key letters or abbreviations may be used if proper meaning or explanation is set forth in the record.

(d) Each entry in the records of each station shall be signed by a person qualified to do so, having actual knowledge of the facts to be recorded.

(e) No record or portion thereof shall be erased, obliterated, or willfully destroyed within the required retention period. Any necessary correction may be made only by the person originating the entry, who shall strike out the erroneous portion, initial the correction made and indicate the date of correction.

(f) Records required by this part shall be retained by the licensee for a period of at least one year.

Subpart E—Miscellaneous Common Carrier Provisions

§101.301 National defense; free service.

Any common carrier authorized under the rules of this part may render to any agency of the United States Government free service in connection with the preparation for the national defense. Every such carrier rendering any such free service must make and file, in duplicate, with the Commission, on or before the 31st of July and on or before the 31st day of January in each year, reports covering the periods of 6 months ending on the 30th of June and the 31st of December, respectively, next prior to said dates. These reports must show the names of the agencies to which free service was rendered pursuant to this rule, the general character of the communications handled for each agency, and the charges in dollars which would have accrued to the carrier for such service rendered to each agency if charges for such communications had been collected at the published tariff rates.

§101.303 Answers to notices of violation.

Any person receiving official notice of a violation of the terms of the Communications Act of 1934, as amended, any other Federal statute or Executive Order pertaining to radio or wire communications or

any international radio or wire communications treaty or convention, or regulations annexed thereto to which the United States is a party, or the rules and regulations of the Federal Communications Commission, must, within 10 days from such receipt, send a written answer to the office of the Commission originating the official notice. If an answer cannot be sent or an acknowledgment made within such 10-day period by reason of illness or other unavoidable circumstances, acknowledgment and answer must be made at the earliest practicable date with a satisfactory explanation of the delay. The answer to each notice must be complete in itself and may not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus, the answer must state fully what steps have been taken to prevent future violations, and, if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and promised date of delivery. If the installation of such apparatus requires a construction permit, the file number of the application must be given or, if a file number has not been assigned by the Commission, such identification as will permit ready reference thereto. If the notice of violation relates to inadequate maintenance resulting in improper operation of the transmitter, the name and license number of the operator performing the maintenance must be given. If the notice of violation relates to some lack of attention to, or improper operation of, the transmitter by other employees, the reply must enumerate the steps taken to prevent a recurrence of such lack of attention or improper operation.

§101.305 Discontinuance, reduction or impairment of service.

(a) If the public communication service provided by a station in the Common Carrier Radio Services, the Local Multipoint Distribution Service or 24 GHz Service is involuntarily discontinued, reduced or impaired for a period exceeding 48 hours, the station licensee must promptly notify the Commission. In every such case, the licensee must furnish full particulars as to the reasons for such discontinuance, reduction or impairment of service, including a statement as to when normal service is expected to be resumed. When normal service is resumed, prompt notification thereof must be given Commission.

(b) No station licensee subject to title II of the Communications Act of 1934, as amended, may voluntarily discontinue, reduce or impair public communication service to a community or part of a community without obtaining prior authorization from the Commission pursuant to the procedures set forth in part 63 of this chapter. In the event that permanent discontinuance of service is authorized by the Commission, the station license is terminated; except that station licenses in the Local Multipoint Distribution Service and 24 GHz Service are not terminated if the discontinuance is a result of a change of status by the licensee from common carrier to non-common carrier pursuant to §1.929 of this chapter.

(c) Any licensee not subject to title II of the Communications Act of 1934, as amended, who voluntarily discontinues, reduces or impairs public communication service to a community or a part of a community must notify the Commission within 7 days thereof. In the event of permanent discontinuance of service, the station license is automatically terminated; except that station licenses in the Local Multipoint Distribution Service and 24 GHz Service are not terminated if the discontinuance is a result of a change of status by the licensee from non-common carrier to common carrier pursuant to §1.929 of this chapter.

(d) If any common carrier radio frequency should not be used to render any service as authorized during a consecutive period of twelve months at any time after construction is completed under circumstances that do not fall within the provisions of paragraph (a), (b), or (c) of this section, or, if removal of equipment or facilities has rendered the station not operational, the licensee must, within thirty days of the end of such period of nonuse:

(1) Cancel the station license (or licenses); or

(2) File an application for modification of the license (or licenses) to delete the unused frequency (or frequencies); or

(3) Request waiver of this rule and demonstrate either that the frequency will be used (as evidenced by appropriate requests for service, etc.) within six months of the end of the initial period of nonuse, or that the frequency will be converted to allow rendition of other authorized public services within one year of the end of the initial period of nonuse by the filing of appropriate applications within six months of the end of the period of nonuse.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23168, Apr. 29, 1997; 63 FR 68983, Dec. 14, 1998; 65 FR 59359, Oct. 5, 2000]

§101.307 Tariffs, reports, and other material required to be submitted to the Commission.

Sections 1.771 through 1.815 of this chapter contain summaries of certain materials and reports, including schedule of charges and accounting and financial reports, which, when applicable, must be filed with the Commission.

§101.309 Requirement that licensees respond to official communications.

All licensees in these services are required to respond to official communications from the Commission with reasonable dispatch and according to the tenor of such communications. Failure to do so will be given appropriate consideration in connection with any subsequent applications which the offending party may file and may result in the designation of such applications for hearing, or in appropriate cases, the institution of proceedings looking to the modification or revocation of the pertinent authorizations.

§101.311 Equal employment opportunities.

Equal opportunities in employment must be afforded by all common carrier licensees and all Local Multipoint Distribution Service and 24 GHz Service licensees in accordance with the provisions of §21.307 of this chapter.

[65 FR 59359, Oct. 5, 2000]

Subpart F [Reserved]

Subpart G—24 GHz Service and Digital Electronic Message Service

§101.501 Eligibility.

See §101.147(n) for licensing of DEMS facilities in the 10.6 GHz band. Applications for new facilities using the 18 GHz band are no longer being accepted. Any entity, other than one precluded by §101.7, is eligible for authorization to provide 24 GHz Service under this subpart.

[65 FR 59359, Oct. 5, 2000]

§101.503 Digital Electronic Message Service Nodal Stations.

10.6 GHz DEMS Nodal Stations may be authorized only as a part of an integrated communication system wherein 10.6 GHz DEMS User Stations associated therewith also are licensed to the 10.6 GHz DEMS Nodal Station licensee. Applications for 10.6 GHz DEMS Nodal Station licenses should specify

the maximum number of 10.6 GHz DEMS User Stations to be served by that nodal station. Any increase in that number must be applied for pursuant to §1.913 of this chapter.

[65 FR 59359, Oct. 5, 2000]

§101.505 Frequencies.

Frequencies, and the conditions on which they are available, for DEMS operations are contained in this subpart as well as in §101.147(m), (n), and (r)(9).

[65 FR 59359, Oct. 5, 2000]

§101.507 Frequency stability.

The frequency stability in the 10,550-10,680 MHz band must be ±0.0001% for each DEMS Nodal Station transmitter and ±0.0003% for each DEMS User Station transmitter. The frequency stability in the 24,250-25,250 MHz bands must be ±0.001% for each Nodal Station transmitter and ±0.003% for each User Station transmitter.

[68 FR 4961, Jan. 31, 2003]

§101.509 Interference protection criteria.

(a) As a condition for use of frequencies in this service each licensee is required to:

(1) Engineer the system to be reasonably compatible with adjacent and co-channel operations in the same or adjacent areas on all frequencies; and

(2) Cooperate fully and in good faith to resolve whatever potential interference and transmission security problems may be present in adjacent and co-channel operations.

(b) All harmful interference to other users of co-channel and adjacent channel use in the same or adjacent geographical area are prohibited. In areas where Economic Areas are in close proximity, careful consideration should be given to minimum power requirements and to the location, height, and radiation pattern of the transmitting and receiving antennas. Licensees are expected to cooperate fully in attempting to resolve problems of potential interference before bringing the matter to the attention of the Commission.

(c) Licensee shall coordinate their facilities whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area. Licensees are encouraged to develop operational agreements with relevant licensees in the same or adjacent areas. Incumbent SMSA licensee(s) shall retain exclusive rights to its channel(s) within its SMSA and must be protected.

(d) Licensees shall comply with the appropriate coordination agreements between the United States and Canada and the United States and Mexico concerning cross-border sharing and use of the 24 GHz bands which may require using channels pairs in accordance with the table in §101.147(r)(9).

(e) The Commission recommends that coordination is not necessary if the power flux density (pfd) at the boundary of the relevant adjacent area is lower than −114 dBW/m^2 in any 1 MHz. This value can be changed and agreed upon by both coordinating parties. Licensees should be able to deploy with a pfd up to −94 dBW/m^2 in any 1 MHz at the boundary of the relevant adjacent area without negatively affecting the successful operations of the adjacent area licensee.

[65 FR 59360, Oct. 5, 2000]

§101.511 Permissible services.

(a) Authorizations for stations in the 24 GHz Service will be granted to provide services on a common carrier basis or a non-common carrier basis or on both a common carrier and non-common carrier basis in a single authorization.

(b) Stations may render any kind of digital communications service consistent with the Commission's rules and the regulatory status of the station to provide services on a common carrier or non-common carrier basis.

(c) An applicant or licensee may submit a petition at any time requesting clarification of the regulatory status required to provide a specific communications service.

[65 FR 59360, Oct. 5, 2000]

§101.513 Transmitter power.

The transmitter power will be governed by §101.113. Further, each application must contain an analysis demonstrating compliance with §101.113(a).

§101.515 Emissions and bandwidth.

Different types of emissions may be authorized if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the bandwidth desired is no wider than needed to provide the intended service. In no event, however, may the necessary or occupied bandwidth exceed the specified channel width of the assigned pair.

§101.517 Antennas.

(a) Transmitting antennas may be omnidirectional or directional, consistent with coverage and interference requirements.

(b) The use of horizontal or vertical plane wave polarization, or right hand or left hand rotating elliptical polarization must be used to minimize harmful interference between stations.

(c) Directive antennas must be used at all DEMS User Stations and may be elevated no higher than necessary to assure adequate service. Antenna structures requiring FAA notification under part 17 of this chapter must be registered with the Commission. The structure owner is responsible for registering, painting, and lighting the structure if applicable. Requests for such authorization must show the inclusive dates of the proposed operation.

§101.519 Interconnection.

(a) All DEMS licensees must make available to the public all information necessary to allow the manufacture of user equipment that will be compatible with the licensee's network.

(b) All DEMS licensees must make available to the public all information necessary to allow interconnection of DEMS networks.

§101.521 Spectrum utilization.

All applicants for DEMS frequencies in the 10.6 GHz band must submit as part of the original application a detailed plan indicating how the bandwidth requested will be utilized. In particular the application must contain detailed descriptions of the modulation method, the channel time sharing method, any error detecting and/or correcting codes, any spatial frequency reuse system and the total data throughput capacity in each of the links in the system. Further, the application must include a separate analysis of the spectral efficiency including both information bits per unit bandwidth and the total bits per unit bandwidth.

[65 FR 59360, Oct. 5, 2000]

§101.523 Service areas.

(a) The service areas for 24 GHz are Economic Areas (EAs) as defined in this paragraph (a). The Bureau of Economic Analysis, U.S. Department of Commerce, organized the 50 States and the District of Columbia into 172 EAs.*See* 60 FR 13114 (March 10, 1995). Additionally, there are four FCC-created EA-like areas:

(1) Guam and Northern Mariana Islands;

(2) Puerto Rico and the U.S. Virgin Islands;

(3) American Samoa, and

(4) the Gulf of Mexico. The Gulf of Mexico EA extends from 12 nautical miles off the U.S. Gulf coast outward into the Gulf. *See* 62 FR 9636 (March 3, 1997), in which the Commission created an additional four economic area-like areas for a total of 176 EA service areas. Maps of the EAs and the FEDERAL REGISTER Notice that established the 172 Economic Areas (EAs) are available for public inspection and copying at the FCC Reference Center, Room CY A-257, 445 12th St., SW., Washington, DC 20554. These maps and data are also available on the FCC Web site at*www.fcc.gov/oet/info/maps/areas/.*

(b) Where an incumbent SMSA license area in the 24 GHz band occupies only a portion of an EA available for application under the competitive bidding rules, the SMSA portion will be excluded from auction and the incumbent licensee will retain the exclusive right to those channels within the SMSA.

[65 FR 59360, Oct. 5, 2000, as amended at 69 FR 44608, July 27, 2004]

§101.525 24 GHz system operations.

(a) A licensee using the 24 GHz band may construct and operate any number of fixed stations anywhere within the area authorized to serve without prior authorization, except as follows:

(1) A station would be required to be individually licensed if:

(i) International agreements require coordination;

(ii) Submission of an Environmental Assessment is required under §1.1307 of this chapter;

(iii) The station would affect areas identified in §1.924 of this chapter.

(2) Any antenna structure that requires notification to the Federal Aviation Administration (FAA) must be registered with the Commission prior to construction under §17.4 of this chapter.

(b) Whenever a licensee constructs or makes system changes as described in paragraph (a)(1) of this section, the licensee is required to notify the Commission within 30 days of the change under §1.947 of this chapter and include a statement of the technical parameters of the changed station.

[65 FR 59360, Oct. 5, 2000, as amended at 69 FR 17959, Apr. 6, 2004]

§101.526 License term.

The license term for stations licensed under this subpart is ten years from the date of license grant or license renewal for incumbent licensees.

[65 FR 59360, Oct. 5, 2000]

§101.527 Construction requirements for 24 GHz operations.

(a) Each licensee must make a showing of “substantial service” within ten years of its license grant. A “substantial service” assessment will be made at renewal pursuant to the provisions and procedures set forth in §1.949 of this chapter. “Substantial service” is a service which is sound, favorable, and substantially above a level of mediocre service which just might minimally warrant renewal during its past license term.

(b) Each licensee must, at a minimum file:

(1) A report, maps and other supporting documents describing its current service in terms of geographic coverage and population served to the Commission. The report must also contain a description of the licensees' investments in its operations. The report must be labeled as an attachment to the renewal application; and

(2) Copies of all FCC orders finding the licensee to have violated the Communications Act or any FCC rule or policy; and a list of any pending proceedings that relate to any matter described in this paragraph (b)(2).

(c) Failure to demonstrate that substantial service is being provided in the service area will result in forfeiture of the license, and the licensee will be unable to regain it.

(d) The frequencies associated with incumbent authorizations, licensed on a SMSA basis, that have cancelled automatically or otherwise been recovered by the Commission will automatically revert to the applicable EA licensee.

[65 FR 59360, Oct. 5, 2000]

§101.529 Renewal expectancy criteria for 24 GHz licenses.

(a) A renewal applicant involved in a renewal proceeding shall receive a preference, commonly referred to as a renewal expectancy, that is the most important factor to be considered in the proceeding as long as the applicant's past record for the relevant license period demonstrates that:

(1) The renewal applicant has provided “substantial service” pursuant to §101.527; and

(2) The renewal applicant has substantially complied with applicable FCC rules, policies, and the Communications Act of 1934, as amended.

(b) In order to establish its right to a renewal expectancy, a licensee in the 24 GHz service involved in a renewal proceeding must submit a showing explaining why it should receive a renewal expectancy. At a minimum, this showing must include:

(1) A description of how the licensee has complied with the “substantial service” requirement; and

(2) Copies of all FCC orders finding the licensee to have violated the Communications Act or any FCC rule or policy; and a list of any pending proceedings that relate to any matter described in this paragraph (b)(2).

(c) In making its showing of entitlement to a renewal expectancy, a renewal applicant may claim credit for any system modification applications that were pending on the date it filed its renewal application. Such credit will not be allowed if the modification application is dismissed or denied.

[65 FR 59361, Oct. 5, 2000]

§101.531 [Reserved]

§101.533 Regulatory status.

(a) *Initial applications.* An applicant for a 24 GHz license must specify on FCC Form 601 if it is requesting authorization to provide services on a common carrier basis, a non-common carrier basis, or on both a common carrier and non-common carrier basis.

(b) *Amendment of pending applications.* Any pending application may be amended to:

(1) Change the carrier status requested; or

(2) Add to the pending request in order to obtain both common carrier and non-common carrier status in a single license.

(c) *Modification of license.* A licensee may modify a license to:

(1) Change the carrier status authorized; or

(2) Add to the status authorized in order to obtain both common carrier and non-common carrier status in a single license.

[65 FR 59361, Oct. 5, 2000]

§101.535 Geographic partitioning and spectrum aggregation/disaggregation.

(a) *Eligibility.* (1) 24 GHz licensees may apply to the Commission to partition their licensed geographic service areas to eligible entities and are free to determine the portion of their service areas to be partitioned. 24 GHz licensees may aggregate or disaggregate their licensed spectrum at any time following the grant of a license.

(2) Any existing frequency coordination agreements shall convey with the assignment of the geographic area or spectrum, and shall remain in effect unless new agreements are reached.

(b) *Technical standards*—(1) *Aggregation.* There is no limitation on the amount of spectrum that a 24 GHz licensee may aggregate.

(2) *Partitioning.* In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to §1.948 of this chapter and list the partitioned service area on a schedule to the application. The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83).

(3) *Disaggregation.* Spectrum may be disaggregated in any amount. A licensee need not retain a minimum amount of spectrum.

(4) *Combined partitioning and disaggregation.* The Commission will consider requests for partial assignment of licenses that propose combinations of partitioning and disaggregation.

(c) *License term.* The license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the original licensee's license term as provided for in §101.526.

(d) *Construction requirements.* Applications requesting approval for partitioning or disaggregation must include a certification by each party stating that one or both parties will satisfy the construction requirement set forth in §101.529. Failure by a party to meet its respective construction requirement will result in the automatic cancellation of its license without further Commission action.

[65 FR 59361, Oct. 5, 2000, as amended at 67 FR 46379, July 9, 2002]

§101.537 24 GHz band subject to competitive bidding.

Mutually exclusive initial applications for 24 GHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

[67 FR 46379, July 9, 2002]

§101.538 Designated entities.

(a) *Eligibility for small business provisions.* (1) A very small business is an entity that, together with its controlling interests and affiliates, has average gross revenues not exceeding $3 million for the preceding three years.

(2) A small business is an entity that, together with its controlling interests and affiliates, has average gross revenues not exceeding $15 million for the preceding three years.

(3) An entrepreneur is an entity that, together with its controlling interests and affiliates, has average gross revenues not exceeding $40 million for the preceding three years.

(b) *Bidding credits.* A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses may use the bidding credit specified in §1.2110(f)(2)(i) of this chapter. A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses may use the bidding credit specified in §1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as an entrepreneur, as defined in this section, or a consortium of entrepreneurs may use the bidding credit specified in §1.2110(f)(2)(iii) of this chapter.

[65 FR 59361, Oct. 5, 2000, as amended at 67 FR 46379, July 9, 2002; 68 FR 43002, July 21, 2003]

Subpart H—Private Operational Fixed Point-to-Point Microwave Service

§101.601 Eligibility.

Any person, or any governmental entity or agency, eligible for licensing in a radio service or pool under part 80, 87, or 90 of this chapter or any person proposing to provide communications service to such persons, governmental entities or agencies is eligible to hold a license under this subpart. Except as provided in section 101.604, this subpart shall not apply to stations offering ~~MVDDS~~LMFUS in the 12.2-12.7 GHz band.

[62 FR 18936, Apr. 17, 1997, as amended at 67 FR 43040, June 26, 2002]

§101.603 Permissible communications.

(a) Except as provided in paragraph (b) of this section, stations in this radio service may transmit communications as follows:

(1) On frequencies below 21,200 MHz, licensees may transmit their own communications, including the transmission of their products and information services, to their customers except that the distribution of video entertainment material to customers is permitted only as indicated in §101.101 and paragraph (a)(2) of this section.

(2) In the frequency bands 6425-6525 MHz, 17,700-18,580 MHz, and on frequencies above 21,200 MHz, licensees may deliver any of their own products and services to any receiving location;

(3) Licensees may transmit the communications of their parent corporation, or of another subsidiary of the same parent, or their own subsidiary where the party to be served is regularly engaged in any of the activities that constitute the basis for eligibility to use the frequencies assigned;

(4) Licensees may transmit the communications of other parties in accordance with §101.135;

(5) Licensees may transmit emergency communications unrelated to their activities in accordance with §101.205;

(6) Licensees may transmit communications on a commercial basis to eligible users, among different premises of a single eligible user, or from one eligible user to another as part of transmissions by Digital Electronic Message Service systems on the frequencies provided for this purpose;

(7) Licensees may transmit program material from one location to another;

(b) Stations licensed in this radio service shall not:

(1) Render a common carrier service of any kind. However, licensees are allowed to lease excess capacity to common carriers. In addition, Specialized Mobile Radio (SMR) licensees reclassified by the Commission as Commercial Mobile Radio Services (CMRS), that were formerly private land mobile radio service providers, may continue to utilize private operational fixed microwave systems licensed prior to April 1, 2003 for their land mobile connecting facilities.

(2) Transmit program material for use in connection with broadcasting, except as provided in paragraphs (a)(2), and (a)(7)) of this section; and/or

(3) Be used to provide the final RF link in the chain of transmission of program material to multichannel video programming distributors, except in the frequency bands 6425-6525 MHz and 17,700-18,580 MHz and on frequencies above 21,200 MHz.

[61 FR 26677, May 28, 1996, as amended at 68 FR 4961, Jan. 31, 2003; 71 FR 69052, Nov. 29, 2006; 76 FR 59574, Sept. 27, 2011]

§101.604 Treatment of incumbent licensees.

Terrestrial private operational fixed point-to-point licensees in the 12.2-12.7 GHz band which were licensed prior to LMFUS stations are not entitled to protection from harmful interference caused by later LMFUS entrants in the 12.2-12.7 GHz band, except for public safety stations which must be protected. LMFUS operators have the responsibility of resolving any harmful interference problems that their operations may cause to these public safety incumbent point-to-point operations in the 12.2-12.7 GHz band. Incumbent public safety terrestrial point-to-point licensees may only make minor changes to their stations without losing this protection. This does not relieve current point-to-point licensees of their obligation to protect BSS operations in the subject frequency band.

Subpart I—Common Carrier Fixed Point-to-Point Microwave Service

§101.701 Eligibility.

(a) Authorizations for stations in this service will be issued to existing and proposed common carriers. Applications will be granted only in cases in which it is shown that:

(1) The applicant is legally, technically, financially and otherwise qualified to render the proposed service;

(2) There are frequencies available to enable the applicant to render a satisfactory service; and

(3) The public interest, convenience, and necessity would be served by a grant thereof.

(b) If the content is originated, selected, controlled, or otherwise substantively influenced by the applicant, licensee, or a closely affiliated entity, no station or radio frequency in this service will be authorized, or may be utilized, to transmit any closed circuit television signals or television signals other than broadcast television signals, unless:

(1) Such service is otherwise permitted for a specific length of time by grant of an acceptable petition for waiver of this rule; or

(2) Such service is otherwise permitted by a condition in the applicable instrument of authorization; or

(3) Such service is provided pursuant to applicable FCC tariff and is temporary and occasional intra-company television communication for management, network supervision, or other internal carrier functions. For purposes of this paragraph, an entity will be considered to be “closely affiliated” with an applicant if it is in a parent-subsidiary relationship, or both are commonly controlled, or they have any common officers or management employees.

(c) Applications for stations or frequencies that will be used primarily to relay broadcast television signals must include a certification that at least fifty percent of the customers (or points of service) on the microwave system involved, including those served through an interconnecting carrier(s), receiving applicant's service, will not be related or affiliated in any degree with the applicant, and that the

proposed usage by such customers, in terms of hours of use and channels delivered, must constitute at least fifty percent of the usage of the applicant's microwave service. Applications that do not contain these certifications will be returned as unacceptable for filing.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68983, Dec. 14, 1998]

§101.703 Permissible communications.

Stations in this service are authorized to render any kind of communication service provided for in the legally applicable tariffs of the carrier, unless otherwise directed in the applicable instrument of authorization or limited by §101.147 or §§101.111 and 101.113.

§101.705 Special showing for renewal of common carrier station facilities using frequency diversity.

Any application for renewal of license, for a term commencing January 1, 1975, or after, involving facilities utilizing frequency diversity must contain a statement showing compliance with §101.103(c) or the exceptions recognized in paragraph 141 of the *First Report and Order* in Docket No. 18920 (29 FCC 2d 870). (This document is available at: Federal Communications Commission, Library (Room TW-B505), 445 Twelfth Street, SW, Washington, DC) If not in compliance, a complete statement with the reasons therefore must be submitted.

[64 FR 53242, Oct. 1, 1999]

Subpart J—Local Television Transmission Service

§101.801 Eligibility.

Authorizations for stations in this service will be granted to existing and proposed communication common carriers. Applications will be granted only in cases where it is shown that:

(a) The applicant is legally, financially, technically and otherwise qualified to render the proposed service;

(b) There are frequencies available to enable the applicant to render a satisfactory service; and

(c) The public interest, convenience or necessity would be served by a grant thereof.

§101.803 Frequencies.

(a) Frequencies in the following bands are available for assignment to television pickup and television non-broadcast pickup stations in this service:

6,425 to 6,525 MHz. (6)

11,700 to 12,200 MHz. (3)

13,200 to 13,250 MHz. (1)

14,200 to 14,400 MHz. (8)

21,200 to 22,000 MHz. (1), (2), (4), (5)

22,000 to 23,600 MHz. (1), (2), (5)

31,000 to 31,300 MHz. (7)

Notes

(1) This frequency band is shared with fixed and mobile stations licensed under this and other parts of the Commission's Rules.

(2) This frequency band is shared with Government stations.

(3) This frequency band is shared, on a secondary basis, with stations in the broadcasting-satellite and fixed-satellite services. As of March 1, 2005, no new LTTS operators will be licensed in the 11.7-12.2 GHz band. LTTS operators authorized prior to March 1, 2005 may continue to operate in 11.7-12.2 GHz band until their license expires; no existing LTTS licenses will be renewed in the 11.7-12.2 GHz band.

(4) This frequency band is shared with stations in the earth-exploration satellite service.

(5) This frequency band is shared with the common carrier and private-operational fixed point-to-point microwave services.

(6) This band is co-equally shared with mobile stations licensed pursuant to parts 74 and 78 of this chapter, and subpart H of this part.

(7) As of June 30, 1997, frequencies in this band only are available for assignment to LMDS radio stations, except for non-LMDS radio stations authorized pursuant to applications refiled no later than June 26, 1998. Stations authorized prior to June 30, 1997, may continue to operate within the existing terms of the outstanding licenses, subject to renewal. Non-LMDS stations authorized pursuant to applications refiled no later than June 26, 1998 shall operate on an unprotected basis and subject to harmful interference from similarly licensed stations or stations licensed prior to June 30, 1997, and on a secondary basis to LMDS radio stations.

(8) The maximum power for the local television transmission service in the 14.2-14.4 GHz band is + 45 dBW except that operations are not permitted within 1.5 degrees of the geostationary orbit. As of March 1, 2005, no new LTTS operators will be licensed in the 14.2-14.4 GHz band. LTTS operators authorized prior to March 1, 2005 may continue to operate in 14.2-14.4 GHz band until their license expires; no existing LTTS licenses will be renewed in the 11.7-12.2 GHz band.

(b) Communications common carriers in the Local Television Transmission Service may be assigned frequencies listed in §§74.602(a), 78.18(a)(6), and 78.18(a)(7) of this chapter to provide service to television broadcast stations, television broadcast network-entities, cable system operators, and cable network-entities. Frequency availability is subject to the provisions of §74.604 of this chapter and the use of the facility is limited to the permissible uses described in §§74.631 and 78.11 of this chapter. Operations on these frequencies are subject to the technical provisions of part 74, subpart F, and part 78, subpart D of this chapter.

(c) [Reserved]

(d) Frequencies in the following bands are available for assignment to television STL stations in this service:

3,700 to 4,200 MHz (1)

5,925 to 6,425 MHz (1),(5)

10,700 to 11,700 MHz (1),(6)

11,700 to 12,100 MHz (3)

13,200 to 13,250 MHz (2)

21,200 to 22,000 MHz (2),(4),(7),(8)

22,000 to 23,600 MHz (2),(6),(8)

31,000 to 31,300 MHz (9)

Notes

(1) This frequency band is shared with stations in the Point to Point Microwave Radio Service and, in United States Possessions in the Caribbean area, with stations in the International Fixed Radiocommunications Services.

(2) This frequency band is shared with fixed and mobile stations licensed under this and other parts of the Commission's rules.

(3) This frequency band is shared with space stations (space to earth) in the fixed-satellite service. As of March 1, 2005, no new LTTS operators will be licensed in the 11.7-12.2 GHz band. LTTS operators authorized prior to March 1, 2005 may continue to operate in 11.7-12.2 GHz band until their license expires; no existing LTTS licenses will be renewed in the 11.7-12.2 GHz band.

(4) This frequency band is shared with Government stations.

(5) This frequency band is shared with earth stations (earth to space) in the fixed-satellite services.

(6) The band segments 10.95-11.2 and 11.45-11.7 GHz are shared with space stations (space to earth) in the fixed-satellite service.

(7) This frequency band is shared with space stations (space to earth) in the earth exploration satellite service.

(8) This frequency band is shared with the common carrier and private-operational fixed point-to-point microwave services.

(9) As of June 30, 1997, frequencies in this band only are available for assignment to LMDS radio stations, except for non-LMDS stations authorized pursuant to applications refiled no later than June 26, 1998. Stations authorized prior to June 30, 1997, may continue to operate within the existing terms of the outstanding licenses, subject to renewal. Non-LMDS stations authorized pursuant to applications refiled no later than June 26, 1998 shall operate on an unprotected basis and subject to harmful interference from each other or stations licensed prior to June 30, 1997, and on a secondary basis to LMDS radio stations.

(e) *6425 to 6525 MHz—Mobile Only.* Paired and un-paired operations permitted. Use of this spectrum for direct delivery of video programs to the general public or for multi-channel cable distribution is not permitted. This band is co-equally shared with mobile stations licensed pursuant to parts 74 and 78 of this chapter. The following channel plans apply.

(1) 1 MHz maximum authorized bandwidth channels.

Transmit (or receive) (MHz)	**Receive (or transmit) (MHz)**
6425.5	6475.5
6450.5	6500.5

(2) 8 MHz maximum authorized bandwidth channels.

Transmit (or receive) (MHz)	**Receive (or transmit) (MHz)**

6430.0	6480.0
6438.0	6488.0
6446.0	6596.0
6455.0	6505.0
6463.0	6513.0
6471.0	6521.0

(3) 25 MHz maximum authorized bandwidth channels.

Transmit (or receive) (MHz)	Receive (or transmit) (MHz)
6437.5	6487.5
6462.5	6512.5

(f) The frequency 27.255 MHz in the 27.23-27.28 MHz band is allocated for assignment to microwave auxiliary stations in this service on a shared basis with other radio services. Assignments to stations on this frequency will not be protected from such interference as may be experienced from the emissions of industrial, scientific and medical equipment operating on 27.12 MHz in accordance with §2.106 of this chapter.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23168, Apr. 29, 1997; 63 FR 9448, Feb. 25, 1998; 63 FR 14039, Mar. 24, 1998; 65 FR 38332, June 20, 2000; 68 FR 4961, Jan. 31, 2003; 68 FR 12777, Mar. 17, 2003; 70 FR 4788, Jan. 31, 2005]

§101.805 Assignment of frequencies to mobile stations.

The assignment of frequencies to mobile stations in this service will not be limited to a single licensee within any area. However, geographical limits within which mobile units may operate may be imposed by the Commission.

§101.807 Transmitter power.

Stations in this service will not be authorized to use transmitters having a rated power output in excess of the limits set forth in §101.113(b) and a standby transmitter having a rated power output in excess of that of the main transmitter with which it is associated will not be authorized. As an exception, operations on frequencies listed in §§74.602(a), 78.18(a)(6), and 78.18(a)(7) of this chapter are subject to the power limitations of §§74.636 and 78.101(a).

[68 FR 12777, Mar. 17, 2003]

§101.809 Bandwidth and emission limitations.

(a) Stations in this service operating on frequencies in the 27.23-27.28 MHz band will be authorized to employ only amplitude modulated or frequency modulated emission for radiotelephony. The authorization to use such emissions will be construed to include authority to employ unmodulated emission only for temporary or short periods necessary for equipment testing incident to the construction and maintenance of the station.

(b) Stations in the service operating on frequencies above 940 MHz may be authorized to use amplitude modulated, frequency modulated or pulse type of emission for radiotelephony and television. In addition, the use of unmodulated emission may be authorized in appropriate cases.

(c) The maximum bandwidths which will normally be authorized for single channel operation on frequencies below 500 MHz in this service must not exceed the limits set forth below:

Type of emission	Authorized bandwidth (kHz)
A3E	8
F3E or (G3E)	40

(d) Maximum bandwidths in the following frequency bands must not exceed the limits set forth below:

MAXIMUM AUTHORIZED

Frequency band (MHz)	Bandwidth (MHz)
3,700 to 4,200	[1]20
5,925 to 6,425	[1]30
6,425 to 6,525	25
10,700 to 12,200	[1] [2]40
13,200 to 13,250	25
21,200 to 23,600	[1]50

[1]The maximum bandwidth that will be authorized for each particular frequency in this band is detailed in the appropriate frequency table in §101.147.

[2]As of March 1, 2005, no new LTTS operators will be licensed in the 11.7-12.2 GHz band. LTTS operators authorized prior to March 1, 2005 may continue to operate in 11.7-12.2 GHz band until their license expires; no existing LTTS licensees will be renewed in the 11.7-12.2 GHz band.

(e) The bandwidths authorized on frequencies above 500 MHz must be appropriate to the type of operation in any particular case. An application requesting such authorization must fully describe the modulation, emission, and bandwidth desired and must specify the bandwidth to be occupied.

[61 FR 26677, May 28, 1996, as amended at 68 FR 4961, Jan. 31, 2003; 70 FR 4788, Jan. 31, 2005]

§101.811 Modulation requirements.

(a) The use of modulating frequencies higher than 3000 hertz for single channel radiotelephony or tone signaling on frequencies below 500 MHz is not authorized.

(b) When amplitude modulation is used, the modulation percentage must be sufficient to provide efficient communication and must normally be maintained above 70 percent on positive peaks, but may not exceed 100 percent on negative peaks.

(c) When phase or frequency modulation is used for single channel radiotelephony on frequencies below 500 MHz, the deviation arising from modulation may not exceed plus or minus 15 kHz from the unmodulated carrier.

(d) Each unmultiplexed radiotelephone transmitter having more than 3 watts plate power input to the final radio frequency stage and initially installed at the station in this service after September 4, 1956, must be provided with a device that will automatically prevent modulation in excess of that specified in paragraphs (b) and (c) of this section which may be caused by greater than normal audio level.

§101.813 Remote control operation of mobile television pickup stations.

(a) Mobile television pickup stations (including nonbroadcast) may be operated by remote control from the fixed locations for periods not to exceed 6 months.

(b) The Commission may, upon adequate showing by the licensee as to why the television pickup operations should not be conducted under a fixed station authorization, renew the authority granted under the provisions of paragraph (a) of this section.

(c) Reference should be made to §101.125 concerning mobile station antenna height restrictions and to paragraphs (c) and (f) of §101.131 concerning control points.

§101.815 Stations at temporary fixed locations.

(a) Authorizations may be issued upon proper application for the use of frequencies listed in §101.803 by stations in the Local Television Transmission Service for rendition of temporary service to subscribers under the following conditions:

(1) When a fixed station is to remain at a single location for less than 6 months, the location is considered to be temporary.

(2) When a fixed station authorized to operate at temporary locations is installed and it subsequently becomes necessary for the station to operate from such location for more than six months, an application for a station authorization to specify the permanent location must be filed at least thirty days prior to the expiration of the six month period.

(3) The station must be used only for rendition of communication service at a remote point where the provision of wire facilities is not practicable.

(4) The antenna structure height employed at any location may not exceed the criteria set forth in §17.7 of this chapter unless, in each instance, authorization for use of a specific maximum antenna structure height for each location has been obtained from the Commission prior to erection of the antenna. See §101.125.

(5) Applications for such stations must comply with the provisions of §101.21(f).

(b) Applications for authorizations to operate stations at temporary locations under the provisions of this section may be made upon FCC Form 601. Blanket applications may be submitted for the required number of transmitters.

(c) Prior coordination of mobile assignments will be in accordance with the procedures in §101.103(d) except that the prior coordination process for mobile (temporary fixed) assignments may be completed orally and the period allowed for response to a coordination notification may be less than 30 days if the parties agree.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68984, Dec. 14, 1998; 65 FR 38332, June 20, 2000; 68 FR 4961, Jan. 31, 2003]

§101.817 Notification of station operation at temporary locations.

(a) The licensee of stations authorized pursuant to §101.813 must notify the Commission prior to each period of operation. This notification must include:

(1) The call sign, manufacturer's name, type or model number, output power and specific location of the transmitter(s);

(2) The maintenance location for the transmitter;

(3) The location of the transmitting or receiving station with which it will communicate and the identity of the correspondent operating such facilities;

(4) The exact frequency or frequencies to be used;

(5) The public interest, convenience and necessity to be served by operation of the proposed installation;

(6) The commencement and anticipated termination dates of operation from each location. In the event the actual termination date differs from the previous notification, written notice thereof promptly must be given to the Commission;

(7) Where the notification contemplates initially a service that is to be rendered for a period longer than 90 days, the notification must contain a showing as to why application should not be made for regular authorization; and

(8) A notification must include compliance with the provisions of §101.813(c).

(b) A copy of the notification must be kept with the station license.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68984 Dec. 14, 1998]

§101.819 Stations affected by coordination contour procedures.

In frequency bands shared with the communication-satellite service, applicants must also comply with the requirements of §101.21.

Subpart K [Reserved]

Subpart L—Local Multipoint Distribution Service

SOURCE: 62 FR 23168, Apr. 29, 1997, unless otherwise noted.

§101.1001 Eligibility.

Any entity, other than one precluded by §101.7 and by §101.1003, is eligible for authorization to provide Local Multipoint Distribution Service (LMDS) under this subpart. Authorization will be granted upon proper application filed under the rules in this part.

§101.1005 Frequencies available.

(a) The following frequencies are available for assignment to LMDS in two license blocks:

Block A of 1,150 MHz

27,500-28,350 MHz

29,100-29,250 MHz

31,075-31,225 MHz

Block B of 150 MHz

31,000-31,075 MHz

31,225-31,300 MHz

(b) In Block A licenses, the frequencies are authorized as follows:

(1) 27,500-28,350 MHz is authorized on a primary protected basis and is shared with Fixed Satellite Service (FSS) systems.

(2) 29,100-29,250 MHz is shared on a co-primary basis with feeder links for non-geostationary orbit Mobile Satellite Service (NGSO/MSS) systems in the band and is limited to LMDS hub-to-subscriber transmissions, as provided in §§25.257 and 101.103(h).

(3) 31,075-31,225 MHz is authorized on a primary protected basis and is shared with private microwave point-to-point systems licensed prior to March 11, 1997, as provided in §101.103(b).

(c) In Block B licenses, the frequencies are authorized as follows:

(1) On a primary protected basis if LMDS shares the frequencies with systems licensed as Local Television Transmission Service (LTTS) licensed prior to March 11, 1997, as provided in §101.103(b).

(2) On a co-equal basis with systems not licensed as LTTS prior to March 11, 1997, as provided in §101.103(g).

§101.1007 Geographic service areas and number of licenses.

LMDS service areas are Basic Trading Areas (BTAs) as defined in the Rand McNally 1992 Commercial Atlas & Marketing Guide, 123rd Edition, at pages 38-39, that identifies 487 BTAs based on the 50 States and as defined to include the BTA-like areas of the United States Virgin Islands, American Samoa, Guam, Mayaguez/Aguadilla-Ponce, Puerto Rico, San Juan, Puerto Rico, and the Commonwealth of Northern Marinas, for a total of 493 BTAs.

§101.1009 System operations.

(a) The licensee may construct and operate any number of fixed stations anywhere within the area authorized by the license without prior authorization, except as follows:

(1) A station would be required to be individually licensed if:

(i) International agreements require coordination;

(ii) Submission of an Environmental Assessment is required under §1.1307 of this chapter.

(iii) The station would affect areas identified in §1.924 of this chapter.

(2) Any antenna structure that requires notification to the Federal Aviation Administration (FAA) must be registered with the Commission prior to construction under §17.4 of this chapter.

(b) Whenever a licensee constructs or makes system changes as described in paragraph (a) of this section, the licensee is required to notify the Commission within 30 days of the change under §1.947 of this chapter and include a statement of the technical parameters of the changed station.

[62 FR 23168, Apr. 29, 1997, as amended at 63 FR 68984, Dec. 14, 1998; 69 FR 17959, Apr. 6, 2004]

§101.1011 Construction requirements and criteria for renewal expectancy.

(a) LMDS licensees must make a showing of “substantial service” in their license area within ten years of being licensed. “Substantial” service is defined as service which is sound, favorable, and substantially above a level of mediocre service which might minimally warrant renewal. Failure by any licensee to meet this requirement will result in forfeiture of the license and the licensee will be ineligible to regain it.

(b) A renewal applicant involved in a comparative renewal proceeding shall receive a preference, commonly referred to as a renewal expectancy, that is the most important comparative factor to be considered in the proceeding as long as the applicant's past record for the relevant license period demonstrates that:

(1) The renewal applicant has provided “substantial” service during its past license term; and

(2) The renewal applicant has substantially complied with applicable FCC rules, policies, and the Communications Act of 1934, as amended.

(c) In order to establish its right to a renewal expectancy, an LMDS renewal applicant involved in a comparative renewal proceeding must submit a showing explaining why it should receive a renewal expectancy. At a minimum, this showing must include:

(1) A description of its current service in terms of geographic coverage and population served:

(2) An explanation of its record of expansion, including a timetable of new construction to meet changes in demand for service:

(3) A description of its investments in its LMDS system; and

(4) Copies of all FCC orders finding the licensee to have violated the Communications Act or any FCC rule or policy; and a list of any pending proceedings that relate to any matter described in this paragraph.

(d) In making its showing of entitlement to a renewal expectancy, a renewal applicant may claim credit for any system modification applications that were pending on the date it filed its renewal application. Such credit will not be allowed if the modification application is dismissed or denied.

§101.1013 Permissible communications services.

(a) Authorizations for stations in the Local Multipoint Distribution Service will be granted to provide services on a common carrier basis or a non-common carrier basis or on both a common carrier and non-common carrier basis in a single authorization.

(b) Stations may render any kind of communications service consistent with the Commission's rules and the regulatory status of the station to provide services on a common carrier or non-common carrier basis.

(c) An applicant or licensee may submit a petition at any time requesting clarification of the regulatory status required to provide a specific communications service.

§101.1017 Requesting regulatory status.

(a) *Initial applications.* An applicant will specify on FCC Form 601 if it is requesting authorization to provide services on a common carrier basis, a non-common carrier basis, or on both a common carrier and non-common carrier basis.

(b) *Amendment of pending applications.* (1) Any pending application may be amended to:

(i) Change the carrier status requested, or

(ii) Add to the pending request in order to obtain both common carrier and non-common carrier status in a single license.

(2) Amendments to change, or add to, the carrier status in a pending application are minor amendments pursuant to §1.927 of this chapter.

(c) *Modification of license.* (1) A licensee may modify a license to:

(i) Change the carrier status authorized, or

(ii) Add to the status authorized in order to obtain both common carrier and non-common carrier status in a single license.

(2) Applications to change, or add to, the carrier status in a license are modifications not requiring prior Commission authorization filed under §1.927 of this chapter. If the change results in the discontinuance, reduction, or impairment of an existing service, the licensee is also governed by §101.305(b) or (c) and submits the application under §1.927 of this chapter in conformance with the time frames and requirements of §§101.305 (b) or (c).

[62 FR 23168, Apr. 29, 1997, as amended at 63 FR 68984, Dec. 14, 1998]

Subpart M—Competitive Bidding Procedures for LMDS

SOURCE: 62 FR 23172, Apr. 29, 1997, unless otherwise noted.

§101.1101 LMDS service subject to competitive bidding.

Mutually exclusive initial applications for LMDS licenses are subject to competitive bidding procedures. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

[67 FR 46379, July 9, 2002]

§§101.1102-101.1105 [Reserved]

§101.1107 Bidding credits for very small businesses, small businesses and entrepreneurs.

(a) A winning bidder that qualifies as a very small business, as defined in §101.1112, or a consortium of very small businesses may use a bidding credit of 45 percent to lower the cost of its winning bid.

(b) A winning bidder that qualifies as a small business, as defined in §101.1112, or a consortium of small businesses may use a bidding credit of 35 percent to lower the cost of its winning bid.

(c) A winning bidder that qualifies as an entrepreneur, as defined in §101.1112, or a consortium of entrepreneurs may use a bidding credit of 25 percent to lower the cost of its winning bid.

(d) The bidding credits referenced in paragraphs (a), (b) and (c) of this section are not cumulative.

[68 FR 43002, July 21, 2003]

§101.1109 Records maintenance.

All winning bidders qualifying as very small businesses, small businesses or entrepreneurs shall maintain at their principal place of business an updated file of ownership, revenue, and asset information, including any document necessary to establish eligibility as a very small business, small business or entrepreneur. Licensees (and their successors-in-interest) shall maintain such files for the term of the license. Applicants that do not obtain the license(s) for which they applied shall maintain such files until the grant of such license(s) is final, or one year from the date of the filing of their short-form application (FCC Form 175), whichever is earlier.

[68 FR 43002, July 21, 2003]

§101.1111 Partitioning and disaggregation.

(a) *Definitions. Disaggregation.* The assignment of discrete portions or “blocks” of spectrum licensed to a geographic licensee or qualifying entity.

Partitioning. The assignment of geographic portions of a licensee's authorized service area along geopolitical or other boundaries.

(b) *Eligibility.* (1) Parties seeking approval for partitioning and disaggregation shall request an authorization for partial assignment of a license pursuant to §101.53. Parties shall submit the forms set forth in §101.15(e).

(2) Licensees may apply to partition their licensed geographic service area or disaggregate their licensed spectrum at any time following the grant of their licenses.

(c) *Technical standards*—(1) *Partitioning.* In the case of partitioning, requests for authorization for partial assignment of a license must include, as an attachment, a description of the partitioned service area. The partitioned service area shall be defined by coordinate points at every 3 degrees along the partitioned service area unless an FCC recognized service area is utilized (*i.e.,* Major Trading Area, Basic Trading Area, Metropolitan Service Area, Rural Service Area or Economic Area) or county lines are followed. The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83). In the case where an FCC recognized service area or county lines are utilized, applicants need only list the specific area(s) (through use of FCC designations or county names) that constitute the partitioned area. In such partitioning cases where an unjust enrichment payment is owed the Commission, the request for authorization for partial assignment of a license must include, as an

attachment, a calculation of the population of the partitioned service area and the licensed geographic service area.

(2) *Disaggregation.* Spectrum may be disaggregated in any amount.

(3) *Combined partitioning and disaggregation.* The Commission will consider requests for partial assignment of licenses that propose combinations of partitioning and disaggregation.

(d) *License term.* The license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the original licensee's license term as provided for in §101.67 of this chapter.

(e) *Construction requirements.* Applications requesting approval for partitioning or disaggregation must include a certification by each party that it will satisfy the construction requirement set forth in §101.1011 of this chapter. Failure by a party to meet its respective construction requirement will result in the automatic cancellation of its license without further Commission action.

[63 FR 26507, May 13, 1998]

§101.1112 Definitions.

(a) *Scope.* The definitions in this section apply to §§101.1101 through 101.1112, unless otherwise specified in those sections.

(b) *Very small business.* A very small business is an entity that, together with its affiliates and controlling interests, has average gross revenues for the three preceding years of not more than $15 million.

(c) *Small business.* A small business is an entity that, together with its affiliates and controlling interests, has average gross revenues for the three preceding years of more than $15 million but not more than $40 million.

(d) *Entrepreneur.* An entrepreneur is an entity that, together with its affiliates and controlling interests, has average gross revenues for the three preceding years of more than $40 million but not more than $75 million.

[67 FR 46380, July 9, 2002, as amended at 68 FR 43002, July 21, 2003]

Subpart N—Competitive Bidding Procedures for the 38.6-40.0 GHz Band

SOURCE: 63 FR 6106, Feb. 6, 1998, unless otherwise noted.

§101.1201 38.6-40.0 GHz subject to competitive bidding.

Mutually exclusive initial applications for 38.6-40.0 GHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

[67 FR 46380, July 9, 2002]

§§101.1202-101.1207 [Reserved]

§101.1208 Bidding credits for small businesses.

A winning bidder that qualifies as a small business or a consortium of small businesses, (as defined in §101.1209(b)(1)(i) may use a bidding credit of 25 percent to lower the cost of its winning bid on any of the licenses in this part. A winning bidder that qualifies as a very small business or a consortium of very small businesses, as defined in §101.1209(b)(1)(ii), may use a bidding credit of 35 percent to lower the cost of its winning bid on any of the licenses in this part.

[67 FR 46380, July 9, 2002]

§101.1209 Definitions.

(a) *Scope.* The definitions in this section apply to §§101.1201 through 101.1209, unless otherwise specified in those sections.

(b) *Small business and very small business.* (1) A small business is an entity that together with its affiliates and persons or entities that hold attributable interests in such entity and their affiliates, has average gross revenues that are not more than $40 million for the preceding three years.

(2) A very small business is an entity that together with its affiliates and persons or entities that hold attributable interests in such entity and their affiliates, has average gross revenues that are not more than $15 million for the preceding three years.

[63 FR 6106, Feb. 6, 1998; 63 FR 10781, Mar. 5, 1998, as amended at 67 FR 46380, July 9, 2002; 68 FR 43002, July 21, 2003]

Subpart O—Multiple Address Systems

SOURCE: 65 FR 17450, Apr. 3, 2000, unless otherwise noted.

GENERAL PROVISIONS

§101.1301 Scope.

This subpart sets out the regulations governing the licensing and operation of Multiple Address Systems (MAS). The rules in this subpart are to be used in conjunction with applicable requirements contained elsewhere in the Commission's rules, such as those requirements contained in parts 1 and 22 of this chapter.

§101.1303 Eligibility.

Authorizations for stations in this service will be granted in cases where it is shown that:

(a) The applicant is legally, financially, technically and otherwise qualified to render the proposed service;

(b) There are frequencies available to enable the applicant to render a satisfactory service; and

(c) The public interest, convenience or necessity would be served by a grant thereof.

§101.1305 Private internal service.

A private internal service is a service where entities utilize frequencies purely for internal business purposes or public safety communications and not on a for-hire or for-profit basis.

§101.1307 Permissible communications.

MAS users may engage in terrestrial point-to-point and point-to-multi-point fixed and limited mobile operations.

[66 FR 35111, July 3, 2001]

§101.1309 Regulatory status.

(a) The Commission will rely on each applicant to specify on FCC Form 601 the type of service or services it intends to provide. Each application for authorization in the bands designated for private internal use must include a certification stating why the application satisfies the definition of private internal use.

(b) Any interested party may challenge the regulatory status granted an MAS licensee.

System License Requirements

§101.1311 Initial EA license authorization.

(a) Winning bidders must file an application (FCC Form 601) for an initial authorization in each market and frequency block.

(b) Blanket licenses are granted for each market and frequency block. Applications for individual sites are not required and will not be accepted, except as specified in §101.1329.

§101.1313 License term.

The license term for stations authorized under this subpart is ten years from the date of original issuance or renewal.

§101.1315 Service areas.

In the frequency bands not licensed on a site-by-site basis, the geographic service areas for MAS are Economic Areas (EAs) which are defined by the Department of Commerce's Bureau of Economic Analysis, as modified by the Commission. The EAs will consist of 176 areas, which includes Guam and the Northern Marianas Islands, Puerto Rico and the United States Virgin Islands, American Samoa, and the Gulf of Mexico.

[66 FR 35111, July 3, 2001]

§101.1317 Competitive bidding procedures for mutually exclusive MAS EA applications.

Mutually exclusive initial applications for licenses in the portions of the MAS bands licensed on a geographic area basis are subject to competitive bidding procedures. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

[67 FR 46380, July 9, 2002]

§101.1319 Competitive bidding provisions.

For the purpose of establishing eligibility requirements and bidding credits for competitive bidding for MAS licenses, pursuant to §1.2110 of this chapter, the following definitions apply:

(a) *Eligibility for small business provisions.* (1) A small business is an entity that, together with its affiliates and persons or entities that hold interests in such entity and their affiliates, has average gross revenues for the preceding three years not to exceed $15 million, as determined pursuant to §1.2110 of this chapter.

(2) A very small business is an entity that, together with its affiliates and persons or entities that hold interests in such entity and their affiliates, has average gross revenues for the preceding three years not to exceed $3 million, as determined pursuant to §1.2110 of this chapter.

(b) *Bidding credits.* A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses, may use the bidding credit specified in §1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses, may use the bidding credit specified in §1.2110(f)(2)(i) of this chapter.

[65 FR 17450, Apr. 3, 2000, as amended at 67 FR 46380, July 9, 2002]

§101.1321 License transfers.

(a) An MAS system license acquired through competitive bidding procedures (including licenses obtained in cases of no mutual exclusivity), together with all appurtenances may be transferred, assigned, sold, or given away only in accordance with the provisions and procedures set forth in §1.2111 of this chapter.

(b) An MAS system license obtained through site-based licensing procedures, together with all appurtenances may be transferred, assigned, sold, or given away, to any other entity in accordance with the provisions and procedures set forth in §1.948 of this chapter.

§101.1323 Spectrum aggregation, disaggregation, and partitioning.

(a) *Eligibility.* (1) Parties seeking approval for partitioning and disaggregation shall request from the Commission an authorization for partial assignment of license. Geographic area licensees may participate in aggregation, disaggregation, and partitioning within the bands licensed on a geographic area basis. Site-based licensees may aggregate spectrum in any MAS bands, but may not disaggregate their licensed spectrum or partition their licensed sites.

(2) Eligible MAS licensees may apply to the Commission to partition their licensed geographic service areas to eligible entities and are free to determine the portion of their service areas to be partitioned. Eligible MAS licensees may aggregate or disaggregate their licensed spectrum at any time following the grant of a license.

(b) *Technical standards*—(1) *Aggregation.* (i) There is no limitation on the amount of spectrum that an MAS licensee may aggregate.

(ii) Spectrum licensed to MAS licensees does not count toward the CMRS spectrum cap discussed in §20.6 of this chapter.

(2) *Disaggregation.* Spectrum may be disaggregated in any amount. A licensee need not retain a minimum amount of spectrum.

(3) *Partitioning.* In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to §1.948 of this chapter and list the partitioned service area on a schedule to the application. The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude, and must be based upon the 1983 North American Datum (NAD83).

(4) *Combined partitioning and disaggregation.* The Commission will consider requests from geographic area licensees for partial assignment of licenses that propose combinations of partitioning and disaggregation.

(c) *Construction requirements*—(1) *Disaggregation.* Partial assignors and assignees for license disaggregation have two options to meet construction requirements. Under the first option, the disaggregator and disaggregatee would certify that they each will share responsibility for meeting the applicable construction requirements set forth in §101.1325 for the geographic service area. If parties choose this option and either party fails to meet the applicable construction requirements, both licenses would be subject to forfeiture at renewal. The second option allows the parties to agree that either the disaggregator or disaggregatee would be responsible for meeting the requirements in §101.1325 for the geographic service area. If parties choose this option, and the party responsible for meeting the construction requirement fails to do so, only the license of the non-performing party would be subject to forfeiture at renewal.

(2) *Partitioning.* Partial assignors and assignees for license partitioning have two options to meet construction requirements. Under the first option, the partitionor and partitionee would each certify that they will independently satisfy the applicable construction requirements set forth in §101.1325 for their respective partitioned areas. If either licensee fails to meet its requirement in §101.1325, only the non-performing licensee's renewal application would be subject to dismissal. Under the second option, the partitionor certifies that it has met or will meet the requirement in §101.1325 for the entire market. If the partitionor fails to meet the requirement in §101.1325, however, only its license would be subject to forfeiture at renewal.

(3) All applications requesting partial assignments of license for partitioning or disaggregation must certify in the appropriate portion of the application which construction option is selected.

(4) Responsible parties must submit supporting documents showing compliance with the respective construction requirements within the appropriate construction benchmarks set forth in §101.1325.

(d) *License term.* The license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the original licensee's license term as provided for in §101.1313.

[65 FR 17450, Apr. 3, 2000, as amended at 67 FR 45380, July 9, 2002]

SYSTEM REQUIREMENTS

§101.1325 Construction requirements.

(a) Incumbent and site-based licenses are subject to the construction requirements set forth in §101.63.

(b) Each MAS EA licensee must provide service to at least one-fifth of the population in its service area or “substantial service” within five years of the license grant. In addition, MAS EA licensees must make a showing of continued “substantial service” within ten years of the license grant. Licensees must file maps and other supporting documents showing compliance with the respective construction requirements within the appropriate five- and ten-year benchmarks of the date of their initial licenses.

(c) Failure by any licensee to meet these requirements will result in forfeiture or non-renewal of the initial license, and the licensee will be ineligible to regain it.

[65 FR 17450, Apr. 3, 2000, as amended at 68 FR 4961, Jan. 31, 2003]

§101.1327 Renewal expectancy for EA licensees.

(a) A renewal applicant shall receive a renewal expectancy at the end of the license period as long as the applicant:

(1) Demonstrates that the licensee has provided continued “substantial service,” *i.e.,* service which is sound, favorable, and substantially above a level of mediocre service which just might minimally warrant renewal, during its past license term;

(2) Demonstrates that the licensee has substantially complied with applicable Commission Rules, policies, and the Communications Act of 1934, as amended;

(3) Provides an explanation of the licensee's record of expansion, including a timetable of the construction of new facilities to meet changes in demand for services provided by the licensee; and (4) Provides a description of investments made by the licensee in its system.

(b) In determining whether a renewal applicant has complied with the “substantial service” requirement by the end of the ten-year initial license term, the Commission may consider factors such as:

(1) Whether the licensee is offering a specialized or technologically sophisticated service that does not require a high level of coverage to be of benefit to customers; and

(2) Whether the licensee's operations service niche markets or focus on serving populations outside of areas served by other licensees. The “substantial service” requirement can, however, be met in other ways, and the Commission will review each licensee's showing on a case-by-case basis.

(c) A “substantial service” assessment will be made at renewal pursuant to the procedures contained in §1.949 of this chapter.

[65 FR 17450, Apr. 3, 2000]

§101.1329 EA Station license, location, modifications.

EA licensees may construct master and remote stations anywhere inside the area authorized in their licenses, without prior approval, so long as the Commission's technical and other Rules are complied with, except that individual licenses are required for any master station that:

(a) Requires the submission of an environmental assessment under §1.1307 of this chapter;

(b) Requires international coordination; or

(c) The station would affect areas identified in §1.924 of this chapter.

[65 FR 17450, Apr. 3, 2000, as amended at 69 FR 17959, Apr. 6, 2004]

§101.1331 Treatment of incumbents.

(a) Any MAS station licensed by the Commission prior to July 1, 1999 in the 928.0-928.85 MHz/952.0-952.85 MHz/956.25-956.45 MHz and 928.85-929.0 MHz/959.85-960.0 MHz bands, as well as assignments or transfers of such stations approved by the Commission and consummated as of January 19, 2000, shall be considered incumbent.

(b) Incumbent operators in the 928.0-928.85 MHz/952.0-952.85 MHz/956.25-956.45 MHz bands are grandfathered as of January 19, 2000, and may continue to operate and expand their systems pursuant to the interference protection and co-channel spacing criteria contained in §101.105.

(1) MAS operators are prohibited from acquiring additional frequencies in the 928.0-928.85 MHz/952.0-952.85 MHz/956.25-956.45 MHz bands and the 932.25625-932.49375 MHz/941.25625-941.49375 MHz bands for the purpose of expanding private carrier service and from changing the use of their frequencies in any manner that is inconsistent with this part. Refer to §101.147 for designated uses.

(2) Incumbent operators in the 928.0-928.85 MHz/952.0-952.85 MHz/956.25-956.45 MHz bands will include incumbents as defined in §101.1331(a), as well as, their transferees and/or assignees and the successors of the transferees and/or assignees and retain their grandfathered status, provided that the use of the MAS frequencies remains unchanged from that of the transferor and/or assignor of the license.

(c) Incumbent operators in the 928.85-929.0/959.85-960.0 MHz bands are grandfathered as of January 19, 2000, and may expand their systems provided that the signal level of the additional transmitter(s) does not increase the composite contour that occurs at a 40.2 kilometer (25-mile) radius from the center of each master station transmitter site. Incumbent operators and geographic area licensees may negotiate alternative criteria.

(d) The frequencies associated with incumbent authorizations in the 928/959 MHz bands that have cancelled automatically or otherwise been recovered by the Commission will automatically revert to the applicable EA licensee.

(e) The frequencies associated with incumbent authorizations in the 928/952/956 MHz bands that have cancelled automatically will revert to the Commission.

[65 FR 17450, Apr. 3, 2000, as amended at 66 FR 35111, July 3, 2001]

§101.1333 Interference protection criteria.

(a) *Frequency coordination.* All EA licensees are required to coordinate their frequency usage with co-channel adjacent area licensees and all other affected parties.

(b) EA licensees are prohibited from exceeding a signal strength of 40 dBµV/m at their service area boundaries, unless a higher signal strength is agreed to by all affected co-channel, adjacent area licensees.

(c) EA licensees are prohibited from exceeding a signal strength of 40 dBµV/m at incumbent licensees' 40.2 kilometer (25-mile) radius composite contour specified in §101.1331(c).

(d) In general, licensees shall comply with the appropriate coordination agreements between the United States and Canada and the United States and Mexico concerning cross-border sharing and use of the applicable MAS frequencies.

(1) *Canada—932.0-932.25 MHz and 941.0-941.25 MHz.* (i) Within Lines A, B, C, and D, as defined in §1.928(e) of this chapter, along the U.S./Canada border, U.S. stations operating in the 932.0-932.25 MHz and 941.0-941.25 MHz bands are on a secondary basis and may operate provided that they shall not transmit a power flux density (PFD) at the border greater than −100 dBW/m^2 nor −94 dBW/m^2, respectively. The U.S. has full use of the frequencies in these regions up to the border in the bands 932.25-932.50 MHz and 941.25-941.50 MHz, and Canadian stations may operate on a secondary basis provided they do not exceed the respective PFDs shown above. PFD can be determined using the following formula: PFD (dBW/m^2) = 10 log [EIRP/4π(D^2], where EIRP is in watts, D is in meters, and the power is relative to an isotropic radiator. The technical parameters are also limited by tables 1 and 2:

TABLE 1—MAXIMUM RADIATED POWER

Class of station	Band MHz	Maximum EIRP		Maximum ERP[1]	
		Watts	dBW	Watts	dBW
Master	941.0-941.5	1000	30	600	27.8
Fixed Remote and Master	932.0-932.5	50	17	30	14.8

[1]Where ERP = EIRP/1.64.>

(ii) Maximum antenna height above average terrain for master stations operating at a maximum power shall not exceed 150 meters. Above 150 meters, the power of master stations shall be in accordance with following table:

TABLE 2—ANTENNA HEIGHT—POWER REDUCTION TABLE

Antenna height above average terrain (meters)	EIRP		ERP	
	Watts	dBW	Watts	dBW
Above 305	200	23	120	20.8
Above 275 to 305	250	24	150	21.8
Above 245 to 275	315	25	190	22.8
Above 215 to 245	400	26	240	23.8
Above 180 to 215	500	27	300	24.8
Above 150 to 180	630	28	380	25.8

NOTE TO TABLE 2: This information is from the *Arrangement between the Federal Communications Commission and the National Telecommunications and Information Administration of the United States of America, and Industry Canada concerning the use of the bands 932 to 935 MHz and 941 to 944 MHz along the United States-Canada border* signed in 1994. This agreement also lists grandfathered stations that must be protected.

(2) *Canada—928-929 MHz and 952-960 MHz.* Between Lines A and B and between Lines C and D, as defined in §1.928(e) of this chapter, along the U.S./Canada border, U.S. stations operating in the 928.50-928.75 MHz and 952.50-952.75 MHz bands are on an unprotected basis and may operate provided that they shall not transmit a power flux density (PFD) at or beyond the border greater than −100 dBW/m^2. The U.S. has full use of the frequencies in these regions up to the border in the bands 928.25-928.50 MHz and 952.25-952.50 MHz, and Canadian stations may operate on an unprotected basis provided they do not exceed the PFD above. Frequencies in the bands 928.00-928.25 MHz, 928.75-929.00 MHz, 952.00-952.25 MHz, and 952.75-952.85 MHz are available for use on a coordinated, first-in-time, shared basis subject to protecting grandfathered stations. New stations must provide a minimum of 145 km (90 miles) separation or alternatively limit the actual PFD of the proposed station to −100 dBW/m^2, at the existing co-channel master stations of the other country, or as mutually agreed upon on a case-by-case basis. Coordination is not required if the PFD at the border is lower than −100 dBW/m^2. The technical criteria are also limited by the following:

Maximum EIRP for master stations in the MHz band: 1000 watts (30 dBW) 952-953

Maximum EIRP for fixed remote stations or stations in the 928-929 MHz band: 50 watts (17 dBW) master

Maximum EIRP for mobile master stations: 25 watts (14 dBW)

Maximum antenna height above average master or control stations: 152 m at 1000 watts terrain for EIRP, power derated in accordance with the following table:

Antenna height above average terrain (m)	**EIRP**	
	Watts	**dBm**
Above 305	200	53
Above 275 to 305	250	54
Above 244 to 274	315	55
Above 214 to 243	400	56
Above 183 to 213	500	57
Above 153 to 182	630	58
Below 152	1000	60

NOTE TO TABLE IN PARAGRAPH (D)(2): This information is from the *Arrangement between the Department of Communications of Canada and the Federal Communications Commission of the United States of America Concerning the Use of the Bands 928 to 929 MHz and 952 to 953 MHz along the United States-Canada Border* signed in 1991. This agreement also lists grandfathered stations that must be protected.

(3) *Mexico.* Within 113 kilometers of the U.S./Mexico border, U.S. stations operating in the 932.0-932.25 MHz and 941.0-941.25 MHz bands are on a secondary basis (non-interference to Mexican primary licensees) and may operate provided that they shall not transmit a power flux density (PFD) at or beyond the border greater than −100 dBW/m^2. Upon notification from the Commission, U.S. licensees must take proper measures to eliminate any harmful interference caused to Mexican primary assignments. The U.S. has full use of the frequencies in these regions up to the border in the bands 932.25-932.50 MHz and 941.25-941.50 MHz, and Mexican stations may operate on a secondary basis (non-interference to U.S. primary licensees) provided they do not exceed the PFD shown above. Stations using the 932-932.5 MHz band shall be limited to the maximum effective isotropic radiated power of 50 watts (17 dBW). Stations using the 941-941.5 MHz band shall meet the limits in the following table:

Antenna height above average mean sea level (meters)	**EIRP**	
	Watts	**dBW**
Above 305	200	23
Above 274 to 305	250	24
Above 243 to 274	315	25
Above 213 to 243	400	26
Above 182 to 213	500	27
Above 152 to 182	630	28
Up to 152	1000	30

NOTE TO TABLE IN PARAGRAPH (D)(3): This information is from the *Agreement between the Government of the United States of America and the Government of the United Mexican States Concerning the Allocation and Use of Frequency Bands by Terrestrial Non-Broadcasting Radiocommunication Services Along the Common Border, Protocol #6 Concerning the Allotment and Use of Channels in the 932-932.5 and 941-941.5 MHz Bands for Fixed Point-to-Multipoint Services Along the Common Border* signed in 1994.

[65 FR 17450, Apr. 3, 2000, as amended at 68 FR 4961, Jan. 31, 2003]

Subpart P—[Reserved]

Subpart P—Multichannel Video Distribution and Data Service Rules for the 12.2-12.7 GHz Band

SOURCE: 69 FR 31746, June 7, 2004, unless otherwise noted.

§101.1401 Service areas.

Multichannel Video Distribution and Data Service (MVDDS) is licensed on the basis of Designated Market Areas (DMAs). The 214 DMA service areas are based on the 210 Designated Market Areas delineated by Nielsen Media Research and published in its publication entitled U.S. Television Household Estimates, September 2002, plus four FCC-defined DMA-like service areas.

(a) Alaska—Balance of State (all geographic areas of Alaska not included in Nielsen's three DMAs for the state: Anchorage, Fairbanks, and Juneau);

(b) Guam and the Northern Mariana Islands;

(c) Puerto Rico and the United States Virgin Islands; and

(d) American Samoa.

§101.1403 Broadcast carriage requirements.

MVDDS licensees are not required to provide all local television channels to subscribers within its area and thus are not required to comply with the must-carry rules, nor the local signal carriage requirements of the *Rural Local Broadcast Signal Act*. See Multichannel Video and Cable Television Service Rules, Subpart D (Carriage of Television Broadcast Signals), 47 CFR 76.51-76.70. If an MVDDS licensee meets the statutory definition of Multiple Video Programming Distributor (MVPD), the retransmission consent requirement of section 325(b)(1) of the Communications Act of 1934, as amended (47 U.S.C. 325(b)(1)) shall apply to that MVDDS licensee. Any MVDDS licensee that is an MVPD must obtain the prior express authority of a broadcast station before retransmitting that station's signal, subject to the exceptions contained in section 325(b)(2) of the Communications Act of 1934, as amended (47 U.S.C. 325(b)(2)). Network nonduplication, syndicated exclusivity, sports blackout, and leased access rules shall not be imposed on MVDDS licensees.

§101.1405 Channeling plan.

Each license shall have one spectrum block of 500 megahertz per geographic area that can be divided into any size channels. Disaggregation is not allowed.

§101.1407 Permissible operations for MVDDS.

MVDDS licensees must use spectrum in the 12.2-12.7 GHz band for any digital fixed non-broadcast service (broadcast services are intended for reception of the general public and not on a subscribership basis) including one-way direct-to-home/office wireless service. Mobile and aeronautical services are not authorized. Two-way services may be provided by using other spectrum or media for the return or upstream path.

§101.1409 Treatment of incumbent licensees.

Terrestrial private operational fixed point-to-point licensees in the 12.2-12.7 GHz band which were licensed prior to MVDDS or NGSO FSS satellite stations are incumbent point-to-point stations and are

not entitled to protection from harmful interference caused by later MVDDS or NGSO FSS entrants in the 12.2-12.7 GHz band, except for public safety stations which must be protected. MVDDS and NGSO FSS operators have the responsibility of resolving any harmful interference problems that their operations may cause to these public safety incumbent point-to-point operations in the 12.2-12.7 GHz band. Incumbent public safety terrestrial point to point licensees may only make minor changes to their stations without losing this protection. This does not relieve current point-to-point licensees of their obligation to protect BSS operations in the subject frequency band. All point-to-point applications, including low-power operations, for new licenses, major amendments to pending applications, or major modifications to existing licenses for the 12.2-12.7 GHz band are no longer accepted except for renewals and changes in ownership. See §1.929 of this chapter for definitions of major and minor changes.

§101.1411 Regulatory status and eligibility.

(a) MVDDS licensees are permitted to provide one-way video programming and data services on a non-common carrier and/or on a common carrier basis. MVDDS is not required to be treated as a common carrier service unless it is providing non-Internet voice and data services through the public switched network.

(b) MVDDS licensees in the 12.2-12.7 GHz band are subject to the requirements set forth in §101.7.

(c) Any entity, other than one precluded by §§101.7 and 101.1412, is eligible for authorization to provide MVDDS under this part. Authorization will be granted upon proper application filing in accordance with the Commission's rules.

§101.1412 MVDDS eligibility restrictions for cable operators.

(a) Eligibility for MVDDS license. No cable operator, nor any entity owning an attributable interest in a cable operator, shall have an attributable interest in an MVDDS license if such cable operator's service area significantly overlaps the MVDDS license area, as "significantly overlaps" is defined in paragraph (e) of this section.

(b) Definition of cable operator. For the purposes of paragraph (a) of this section, the term "cable operator" means a company that is franchised to provide cable service, as defined in 47 CFR 76.5(ff) of this chapter, in all or part of the MVDDS license area.

(c) For the purpose of this section, the term "MVPD household" refers to a household that subscribes to one or more Multichannel Video Program Distributors (MVPDs), as defined in 47 CFR 76.1000(e) of this chapter.

(d) Waiver of restriction. Upon completion of the initial award of an MVDDS license, a cable operator may petition for a waiver of the restriction on eligibility based upon a showing that changed circumstances or new evidence indicate that no significant likelihood of substantial competitive harm will result from the operator retaining an attributable interest in the MVDDS license.

(e) Significant overlap with service area. For purposes of paragraph (a) of this section, significant overlap occurs when a cable operator's subscribers in the MVDDS license area make up thirty-five percent or more of the MVPD households in that MVDDS license area.

(f) Definition of attributable interest. For purposes of paragraph (a) of this section, an entity shall be considered to have an attributable interest in a cable operator or MVDDS licensee pursuant to the following criteria:

(1) A controlling interest shall constitute an attributable interest. Controlling interest means majority voting equity ownership, any general partnership interest, or any means of actual working control (including negative control) over the operation of the entity, in whatever manner exercised.

(2) Any general partnership interest in a partnership;

(3) Partnership and similar ownership interests (including limited partnership interests) amounting to 20 percent or more of the total partnership interests, calculated according to both the percentage of equity paid in and the percentage of distribution of profits and losses;

(4) Any stock interest amounting to 20 percent or more of the outstanding voting stock of an entity;

(5) Any voting or non-voting stock interest, amounting to 20 percent or more of the total outstanding stock of an entity;

(6) Stock interests held in trust that exceed the limit set forth in paragraph (f) of this section shall constitute an attributable interest of any person who holds or shares the power to vote such stock, of any person who has the sole power to sell such stock, and, in the case of stock held in trust, of any person who has the right to revoke the trust at will or to replace the trustee at will. If the trustee has a familial, personal, or extra-trust business relationship to the grantor or the beneficiary, the stock interests held in trust shall constitute an attributable interest of such grantor or beneficiary, as appropriate.

(7) Debt and interests such as warrants and convertible debentures, options, or other interests (except non-voting stock) with rights of conversion to voting interests shall not constitute attributable interests unless and until conversion is effected.

(8) An interest in a Limited Liability Company (LLC) or Registered Limited Liability Partnership (RLLP) amounting to 20 percent or more, shall constitute an attributable interest of each such limited partner.

(9) Officers and directors of a cable operator, an MVDDS licensee, or an entity that controls such cable operator or MVDDS licensee, shall be considered to have an attributable interest in such cable operator or MVDDS licensee.

(10) Ownership interests that are held indirectly by any party through one or more intervening corporations or other entities shall be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that, if the ownership for any interest in any link in the chain exceeds 50 percent or represents actual control, it shall be treated as if it were a 100 percent interest.

(11) Any person who manages the operations of a cable operator or an MVDDS licensee pursuant to a management agreement shall be considered to have an attributable interest in such cable operator or MVDDS licensee, if such person or its affiliate has authority to make decisions or otherwise engage in practices or activities that determine, or significantly influence:

(i) The nature or types of services offered by such entity;

(ii) The terms upon which such services are offered; or

(iii) The prices charged for such services.

(12) Any person or its affiliate who enters into a joint marketing arrangement with a cable operator, an MVDDS licensee, or an affiliate of such entity, shall be considered to have an attributable interest in

such cable operator, MVDDS licensee, or affiliate, if such person or its affiliate has authority to make decisions or otherwise engage in practices or activities that determine:

(i) The nature or types of services offered by such entity;

(ii) The terms upon which such services are offered; or

(iii) The prices charged for such services.

(g) *Divestiture.* Any cable operator, or any entity owning an attributable interest in a cable operator, that would otherwise be barred from acquiring an attributable interest in an MVDDS license by the eligibility restriction in paragraph (a) of this section, may be a party to an MVDDS application (*i.e.*, have an attributable interest in the applicant), and such applicant will be eligible for an MVDDS license, pursuant to the divestiture procedures set forth in paragraphs (g)(1) through (g)(6) of this section.

(1) Divestiture shall be limited to the following prescribed means:

(i) An MVDDS applicant holding an attributable interest in a cable operator may divest such interest in the cable company.

(ii) Other MVDDS applicants disqualified under paragraph (a) of this section, will be permitted to:

(A) Partition and divest that portion of the existing service area that causes it to exceed the overlap restriction in paragraph (a) of this section, subject to applicable regulations of state and local governments; or

(B) Partition and divest that portion of the MVDDS geographic service area that exceeds the overlap restriction in paragraph (a) of this section.

(iii) Divestiture may be to an interim trustee if a buyer has not been secured in the required period of time, as long as the MVDDS applicant has no interest in or control of the trustee and the trustee may dispose of the license as it sees fit.

(2) The MVDDS applicant shall certify as an exhibit to its short form application that it and all parties to the application will come into compliance with paragraph (a) of this section.

(3) If such MVDDS applicant is a successful bidder in an auction, it must submit with its long-form application a signed statement describing its efforts to date and future plans to come into compliance with the eligibility restrictions in paragraph (a) of this section.

(4) If such an MVDDS applicant is otherwise qualified, its application will be granted subject to a condition that the applicant shall come into compliance with the eligibility restrictions in paragraph (a) within ninety (90) days of final grant of such MVDDS license.

(5) An MVDDS applicant will be considered to have come into compliance with paragraph (a) of this section if:

(i) In the case of the divestiture of a portion of an MVDDS license service area, it has successfully completed the assignment or transfer of control of the requisite portion of the MVDDS geographic service area.

(ii) In all other cases, it has submitted to the Commission a signed certification that it has come into compliance with paragraph (a) of this section by the following means, identified in such certification:

(A) By divestiture of a disqualifying interest in a cable operator, identified in terms of the interest owned, the owner of such interest (and, if such owner is not the applicant itself, the relationship of the owner to the applicant), the name of the party to whom such interest has been divested, and the date such divestiture was executed; or

(B) By divestiture of the requisite portion of the cable operator's existing service area, identified in terms of the name of the party to whom such interest has been divested, the date such divestiture was executed, the name of any regulatory agency that must approve such divestiture, and the date on which an application was filed for this purpose with the regulatory agency.

(6) If no such certification or application is tendered to the Commission within ninety (90) days of final grant of the initial license, the Commission may cancel or rescind the license automatically, shall retain all monies paid to the Commission, and, based on the facts presented, shall take any other action it may deem appropriate.

NOTE TO §101.1412: Waivers of §101.1412(f) may be granted upon an affirmative showing:

(a) That the interest holder has less than a fifty percent voting interest in the licensee and there is an unaffiliated single holder of a fifty percent or greater voting interest;

(b) That the interest holder is not likely to affect the local market in an anticompetitive manner;

(c) That the interest holder is not involved in the operations of the licensee and does not have the ability to influence the licensee on a regular basis; and

(d) That grant of a waiver is in the public interest because the benefits to the public of common ownership outweigh any potential anticompetitive harm to the market.

[69 FR 31746, June 7, 2004, as amended at 69 FR 59146, Oct. 4, 2004]

§101.1413 License term and renewal expectancy.

(a) The MVDDS license term is ten years, beginning on the date of the initial authorization grant.

(b) Application of a renewal expectancy is based on a showing of substantial service at the end of five years into the license period and ten years into the license period. The substantial service requirement is defined as a service that is sound, favorable, and substantially above a level of mediocre service which might minimally warrant renewal. At the end of five years into the license term and ten years into the license period, the Commission will consider factors such as:

(1) Whether the licensee's operations service niche markets or focus on serving populations outside of areas serviced by other MVDDS licensees;

(2) Whether the licensee's operations serve populations with limited access to telecommunications services; and

(3) A demonstration of service to a significant portion of the population or land area of the licensed area.

(c) The renewal application of an MVDDS licensee must include the following showings in order to claim a renewal expectancy:

(1) A coverage map depicting the served and unserved areas;

(2) A corresponding description of current service in terms of geographic coverage and population served or transmitter locations in the served areas; and

(3) Copies of any Commission Orders finding the licensee to have violated the Communications Act or any Commission rule or policy and a list of any pending proceedings that relate to any matter described by the requirements for the renewal expectancy.

§101.1415 Partitioning and disaggregation.

(a) MVDDS licensees are permitted to partition licensed geographic areas along county borders (Parishes in Louisiana or Territories in Alaska). Disaggregation will not be permitted by MVDDS licensees in the 12.2-12.7 GHz band. "Partitioning" is the assignment of geographic portions of a license along geopolitical or other boundaries. "Disaggregation" is the assignment of discrete portions or "blocks" of spectrum licensed to a geographic licensee or qualifying entity.

(b) *Eligibility.* (1) Parties seeking approval for partitioning shall request from the Commission an authorization for partial assignment of a license pursuant to §1.948 of this chapter.

(2) MVDDS licensees may apply to the Commission to partition their licensed geographic service areas to eligible entities and are free to partition their licensed spectrum at any time following the grant of a license.

(3) Any existing frequency coordination agreements shall convey with the assignment of the geographic area or spectrum, and shall remain in effect for the term of the agreement unless new agreements are reached.

(c) *Technical standards.* (1) Partitioning. In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to §1.948 of this chapter and list the partitioned service area on a schedule to the application.

(2) The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83).

(d) *Unjust enrichment.* 12 GHz licensees that received a bidding credit and partition their licenses to entities not meeting the eligibility standards for such a bidding credit, will be subject to the provisions concerning unjust enrichment as set forth in §1.2111 of this chapter.

(e) *License term.* The MVDDS license term is ten years, beginning on the date of the initial authorization grant. The license term for a partitioned license area shall be the remainder of the original licensee's license term as provided for in §101.1413.

(f) *Construction requirements.* Applications requesting approval for partitioning must include a certification by each party stating that one or both parties will satisfy the construction requirement set forth in §101.1413. Failure by a party to meet its respective construction requirement will result in the automatic cancellation of its license without further Commission action.

§101.1417 Annual report.

Each MVDDS licensee shall file with the Broadband Division of the Wireless Telecommunications Bureau of the Commission two copies of a report by March 1 of each year for the preceding calendar year. This report must include the following:

(a) Name and address of licensee;

(b) Station(s) call letters and primary geographic service area(s); and

(c) The following statistical information for the licensee's station (and each channel thereof):

(1) The total number of separate subscribers served during the calendar year;

(2) The total hours of transmission service rendered during the calendar year to all subscribers;

(3) The total hours of transmission service rendered during the calendar year involving the transmission of local broadcast signals; and

(4) A list of each period of time during the calendar year in which the station rendered no service as authorized, if the time period was a consecutive period longer than 48 hours.

§101.1421 Coordination of adjacent area MVDDS stations.

(a) MVDDS licensees in the 12.2-12.7 GHz band are required to develop sharing and protection agreements based on the design and architecture of their systems, in order to ensure that no harmful interference occurs between adjacent geographical area licensees. MVDDS licensees shall:

(1) Engineer systems to be reasonably compatible with adjacent and co-channel operations in the adjacent areas on all its frequencies; and

(2) Cooperate fully and in good faith to resolve interference and transmission problems that are present on adjacent and co-channel operations in adjacent areas.

(b) Harmful interference to public safety stations, co-channel MVDDS stations operating in adjacent geographic areas, and stations operating on adjacent channels to MVDDS stations is prohibited. In areas where the DMAs are in close proximity, careful consideration should be given to power requirements and to the location, height, and radiation pattern of the transmitting and receiving antennas. Licensees are expected to cooperate fully in attempting to resolve problems of potential interference before bringing the matter to the attention of the Commission.

(c) Licensees shall coordinate their facilities whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area. Licensees are encouraged to develop operational agreements with relevant licensees in the adjacent geographic areas. Incumbent public safety POFS licensee(s) shall retain exclusive rights to its channel(s) within the relevant geographical areas and must be protected in accordance with the procedures in §101.103. A list of public safety incumbents is attached as Appendix I to the Memorandum Opinion and Order and Second Report and Order, Docket 98-206, released May 23, 2002. Please check with the Commission for any updates to that list.

§101.1423 Canadian and Mexican coordination.

Pursuant to §2.301 of this chapter, MVDDS systems in the United States within 56 km (35 miles) of the Canadian and Mexican border will be granted conditional licenses, until final international

agreements are approved. These systems may not cause harmful interference to stations in Canada or Mexico. MVDDS stations must comply with the procedures outlined under §§101.147(p) and 1.928(f)(1) and (f)(2) of this chapter until final international agreements concerning MVDDS are signed. Section 1.928(f) of this chapter states that transmitting antennas can be located as close as five miles (eight kilometers) of the border if they point within a sector of 160 degrees away from the border, and as close as thirty-five miles (fifty-six km) of the border if they point within a sector of 200 degrees toward the border without coordination with Canada. MVDDS licensees shall apply this method near the Canadian and Mexican borders. No stations are allowed within 5 miles of the borders.

§101.1425 RF safety.

MVDDS stations in the 12.2-12.7 GHz frequency band do not operate with output powers that equal or exceed 1640 watts EIRP and therefore will not be subject to the routine environmental evaluation rules for radiation hazards, as set forth in §1.1307 of this chapter.

§101.1427 MVDDS licenses subject to competitive bidding.

Mutually exclusive initial applications for MVDDS licenses in the 12.2-12.7 GHz band are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

§101.1429 Designated entities.

(a) *Eligibility for small business provisions.* (1) A very small business is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $3 million for the preceding three years.

(2) A small business is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $15 million for the preceding three years.

(3) An entrepreneur is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $40 million for the preceding three years.

(b) *Bidding credits.* A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses may use the bidding credit specified in §1.2110(f)(2)(i) of this chapter. A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses may use the bidding credit specified in §1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as an entrepreneur, as defined in this section, or a consortium of entrepreneurs may use the bidding credit specified in §1.2110(f)(2)(iii) of this chapter.

§101.1440 MVDDS protection of DBS.

(a) An MVDDS licensee shall not begin operation unless it can ensure that the EPFD from its transmitting antenna at all DBS customers of record locations is below the values listed for the appropriate region in §101.105(a)(4)(ii). Alternatively, MVDDS licensees may obtain a signed written agreement from DBS customers of record stating that they are aware of and agree to their DBS system receiving MVDDS signal levels in excess of the appropriate EPFD limits specified in §101.105(a)(4)(ii). DBS customers of record are those who had their DBS receive antennas installed prior to or within the 30 day period after notification to the DBS operator by the MVDDS licensee of the proposed MVDDS transmitting antenna site.

(b) MVDDS licensees are required to conduct a survey of the area around its proposed transmitting antenna site to determine the location of all DBS customers of record that may potentially be affected by the introduction of its MVDDS service. The MVDDS licensee must assess whether the

signal levels from its system, under its deployment plans, would exceed the appropriate EPFD levels in §101.105(a)(4)(ii) at any DBS customer of record location. Using EPFD calculations, terrain and building structure characteristics, and the survey results, an MVDDS licensee must make a determination of whether its signal level(s) will exceed the EPFD limit at any DBS customer of record sites. To assist in making this determination, the MVDDS provider can use the EPFD contour model developed by the Commission and described in Appendix J of the Memorandum Opinion and Order and Second Report and Order, ET Docket 98-206 or on the OET website at *http://www.fcc.gov/oet/dockets/et98-206.*

(c) If the MVDDS licensee determines that its signal level will exceed the EPFD limit at any DBS customer site, it shall take whatever steps are necessary, up to and including finding a new transmit site, to ensure that the EPFD limit will not be exceeded at any DBS customer location.

(d) *Coordination between MVDDS and DBS licensees.* (1) At least 90 days prior to the planned date of MVDDS commencement of operations, the MVDDS licensee shall provide the following information to the DBS licensee(s):

(i) Geographic location (including NAD 83 coordinates) of its proposed station location;

(ii) Maximum EIRP of each transmitting antenna system;

(iii) Height above ground level for each transmitting antenna;

(iv) Antenna type along with main beam azimuth and altitude orientation information, and description of the antenna radiation pattern;

(v) Description of the proposed service area; and

(vi) Survey results along with a technical description of how it determined compliance with the appropriate EPFD level at all DBS subscriber locations.

(2) No later than forty-five days after receipt of the MVDDS system information in paragraph (d)(1) of this section, the DBS licensee(s) shall provide the MVDDS licensee with a list of only those new DBS customer locations that have been installed in the 30-day period following the MVDDS notification and that the DBS licensee believes may receive harmful interference or where the prescribed EPFD limits may be exceeded. In addition, the DBS licensee(s) could indicate agreement with the MVDDS licensee's technical assessment, or identify DBS customer locations that the MVDDS licensee failed to consider or DBS customer locations where they believe the MVDDS licensee erred in its analysis and could exceed the prescribed EPFD limit.

(3) Prior to commencement of operation, the MVDDS licensee must take into account any new DBS customers or other relevant information provided by DBS licensees in response to the notification in paragraph (d)(1) of this section.

(e) Beginning thirty days after the DBS licensees are notified of a potential MVDDS site in paragraph (d)(1) of this section, the DBS licensees are responsible for providing information they deem necessary for those entities who install all future DBS receive antennas on its system to take into account the presence of MVDDS operations so that these DBS receive antennas can be located in such a way as to avoid the MVDDS signal. These later installed DBS receive antennas shall have no further rights of complaint against the notified MVDDS transmitting antenna(s).

(f) In the event of either an increase in the EPFD contour in any direction or a major modification as defined in §1.929 of this chapter, such as the addition of an antenna, to an MVDDS station, the

~~procedures of paragraphs (d) and (e) of this section and rights of complaint begin anew. Exceptions to this are renewal, transfer of control, and assignment of license applications.~~

~~(g) *Interference complaints.* The MVDDS licensee must satisfy all complaints of interference to DBS customers of record which are received during a one year period after commencement of operation of the transmitting facility. Specifically, the MVDDS licensee must correct interference caused to a DBS customer of record or cease operation if it is demonstrated that the DBS customer is receiving harmful interference from the MVDDS system or that the MVDDS signal exceeds the permitted EPFD level at the DBS customer location.~~

Subpart Q—Service and Technical Rules for the 70/80/90 GHz Bands

SOURCE: 69 FR 3267, Jan. 23, 2004, unless otherwise noted.

§101.1501 Service areas.

The 70/80/90 GHz bands are licensed on the basis of non-exclusive nationwide licenses. There is no limit to the number of non-exclusive nationwide licenses that may be granted for these bands, and these licenses will serve as a prerequisite for registering individual links.

§101.1505 Segmentation plan.

(a) An entity may request any portion of the 71-76 GHz and 81-86 GHz bands, up to 5 gigahertz in each segment for a total of 10 gigahertz. Licensees are also permitted to register smaller segments.

(b) The 92-95 GHz band is divided into three segments: 92.0-94.0 GHz and 94.1-95.0 GHz for non-government and government users, and 94.0-94.1 GHz for Federal Government use. Pairing is allowed and segments may be aggregated without limit. The bands in paragraph (a) of this section can be included for a possible 12.9 gigahertz maximum aggregation. Licensees are also permitted to register smaller segments than provided here.

[70 FR 29998, May 25, 2005]

§101.1507 Permissible operations.

Licensees may use the 70 GHz, 80 GHz and 90 GHz bands for any point-to-point, non-broadcast service. The segments may be unpaired or paired, but paring will be permitted only in a standardized manner (*e.g.,* 71-72.25 GHz may be paired only with 81-82.25 GHz, and so on). The segments may be aggregated without limit.

§101.1511 Regulatory status and eligibility.

(a) Licensees are permitted to provide services on a non-common carrier and/or on a common carrier basis.

(b) Licensees are subject to the requirements set forth in §101.7.

(c) Any entity, other than one precluded by §101.7, is eligible for authorization to provide service under this part. Authorization will be granted upon proper application filing and link coordination in accordance with the Commission's rules.

§101.1513 License term and renewal expectancy.

The license term is ten years, beginning on the date of the initial authorization (nationwide license) grant. Registering links will not change the overall renewal period of the license.

[70 FR 29998, May 25, 2005]

§101.1523 Sharing and coordination among non-government licensees and between non-government and government services.

(a) Registration of each link in the 71-76 GHz, 81-86 GHz, and 92-95 GHz bands will be in the Universal Licensing System until the Wireless Telecommunications Bureau announces by public notice the implementation of a third-party database.

(b) The licensee or applicant shall:

(1) Complete coordination with Federal Government links according to the coordination standards and procedures adopted in Report and Order, FCC 03-248, and as further detailed in subsequent implementation public notices issued consistent with that order;

(2) Provide an electronic copy of an interference analysis to the third-party database manager which demonstrates that the potential for harmful interference to or from all previously registered non-government links has been analyzed according to the standards of section 101.105 and generally accepted good engineering practice, and that the proposed non-government link will neither cause harmful interference to, nor receive harmful interference from, any previously registered non-government link; and

(3) Provide upon request any information related to the interference analysis and the corresponding link. The third-party database managers shall receive and retain the interference analyses electronically and make them available to the public. Protection of individual links against harmful interference from other links shall be granted to first-in-time registered links. Successful completion of coordination via the NTIA automated mechanism shall constitute successful non-Federal Government to Federal Government coordination for that individual link.

(c) In addition, the following types of non-Federal Government links require the filing with the Commission an FCC Form 601 for each link for the purpose of coordination and registration, in addition to registering each link in the third-party database:

(1) Facilities requiring the submission of an Environmental Assessment,

(2) Facilities requiring international coordination, and

(3) Operation in quiet zones.

(d) The Commission believes the licensee is in the best position to determine the nature of its operations and whether those operations impact these settings, and is required to submit to a database manager, as part of the registration package, documentation that an FCC Form 601 has been filed.

[69 FR 3267, Jan. 23, 2004, as amended at 70 FR 29998, May 25, 2005]

§101.1525 RF safety.

Licensees in the 70-80-90 GHz bands are subject to the exposure requirements found in §§1.1307(b), 2.1091 and 2.1093 of this chapter, and will use the parameters found therein.

§101.1527 Canadian and Mexican coordination.

(a) A licensee of bands 71.0-76.0, 81.0-86.0, 92-94 GHz and 94.1-95 GHz must comply with §1.928(f) of this chapter, which pertains to coordination with Canada.

(b) A licensee of bands 71.0-76.0, 81.0-86.0, 92-94 GHz and 94.1-95 GHz must coordinate with Mexico in the following situations:

(1) For a station the antenna of which looks within the 200 deg. sector toward the Mexico-United States borders, that area in each country within 35 miles of the borders; and

(2) For a station the antenna of which looks within the 160 deg. sector away from the Canada-United States borders, that area in each country within 5 miles of the borders.

Summary report: **Litéra® Change-Pro 7.5.0.135 Document comparison done on 10/31/2016 9:51:26 PM**	
Style name: Default Style	
Intelligent Table Comparison: Active	
Original filename: MVDDS Rules Master Document - Original - 102216.docx	
Modified filename: MVDDS 5G Coalition Rule Revisions - 103116 - Finalized.docx	
Changes:	
Add	196
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~~Move From~~	90
Move To	90
Table Insert	3
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Table moves to	0
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Embedded Graphics (Visio, ChemDraw, Images etc.)	4
Embedded Excel	0
Format changes	0
Total Changes:	687